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DISEASES DUE TO PROTOZOAN PARASITES.

CHANNON (Hilda A.) & HEDLEY (D. Wright). **Observations on Trypanosomiasis of Rabbits, and its Natural Mode of Transmission.**—*Jl. Path. & Bact.* 1927. Apr. Vol. 30. No. 2. pp. 253–260. With 1 fig.

Measurements indicate that the parasite *T. nabiasi* or *T. cuniculi* is monomorphic and the average length of 300 parasites in dried blood films was 24·17 μ, the body itself averaging 15·21 μ.

The strain has been carried through 12 generations by intravenous inoculation, but in only 73 per cent. of inoculated animals did the infection establish itself. In order to transmit the parasite the blood used must contain large numbers of organisms. Experimentally, evidence was furnished that the rabbit flea is the intermediate host of the trypanosome. The incubation period was about a week, and the period of infection ranged from a fortnight to about 3 months.

The cycle of development was not followed, but it appeared from examinations to correspond with that of *T. lewisi* in the rat flea. No stomach forms, such as were described by MINCHIN and THOMSON, were found.

The ingestion of infected flea faeces would seem to be the natural mode of infection. The bites of infected fleas do not convey the infection. Immunity resulting from infection appears to last about 6 months.

It was not found possible to infect rats, mice or guinea-pigs.

DI DOMIZIO (G.). *Trypanosoma brucei* nella Somalia Italiana. [*Trypanosoma brucei* **in Italian Somaliland.**]—*La Nuova Veterinaria.* 1927. Apr. 15. Vol. 5. No. 4. pp. 84–95.

As the result of a large series of inoculation tests, and comparisons with other published accounts, the author comes to the conclusion that the polymorphic trypanosome occurring in cattle in Italian Somaliland is *T. brucei*.

SAVINO (E.). Tripanosomas y glucemia en los animales con "*Trypanosoma equinum.*" [**Trypanosomes and Glycaemia in Animals affected with** *Trypanosoma equinum.*]—*Revist. Instituto Bacteriológico del Dept. Nacional de Higiene.* 1926. Mar. Vol. 4. No. 4. pp. 429–440. With 8 text figs.

[Author's English Abstract.]

1. Insulin diminishes the number of trypanosomes to 70 per cent. in the blood of dogs experimentally infected with *Trypanosoma equinum.*

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2. This reduction is not due to the action of the insulin on the metabolism of the carbohydrates, because if glucose be injected at the same time to prevent hypoglycaemia the number of trypanosomes increases when the glycaemia rises above the initial value.

3. Hyperglycaemia produced in dogs by injecting glucose increases the number of trypanosomes to 120 per cent.

4. Insulin injected into dogs infected with *T. equinum* is less active than in normal dogs.

5. The physiological variations in the glycaemia during the period of infection are not related to the number of trypanosomes in the blood.

CLARK (H. C.). **Equine Trypanosomiasis in Colombia (Rengera or Derrengadera).**—*United Fruit Company, Medical Department, 15th Annual Report.* 1926. pp. 263–265.

The author investigated a disease of horses which had been causing losses in the remote parts of the plantations in January 1926. The disease spread gradually and assumed epidemic proportions in places.

Blood examinations were made by the thick film method of 162 mules, 81 asses, 127 horses and 10 dogs. Five horses only were detected as infected with trypanosomes. Ten horses, 3 mules, and 7 dogs were found to be suffering from piroplasmosis. The author states that equine trypanosomiasis is known to exist in South America, Africa, and Asia, and suggests that the variety of names used to describe the disease in different parts of the world leads to confusion. He implies that one name should be used for surra, nagana, dourine, mal de caderas and other trypanosome infections of equines.

The trypanosome found corresponds to *T. hippicum* (Darling).

"The species of horse-fly credited with being an insect vector in Venezuela is *Tabanus importunus*, Wiedemann. Many important mechanical conveyors of the disease also exist. Any species of fly, while its legs are still wet with blood from a sore or wound on an infected animal, can easily implant the disease on a sore or wound of another animal. Saddles, bridle bits, harness, ropes, etc., that have been in contact with such sores are also potential conveyors."

In a mule artificially infected the author found trypanosomes three weeks before the stable-boys reported the animal as sick.

Trypanosomes are abundant in the peripheral blood every 7 to 10 days; hence the necessity for repeated blood examinations. Bayer 205 is said to have been very satisfactory in the acute stage of the disease, but no details are furnished.

SANI (Luigi). Tripanosi naturale osservata a Milano in un cane proveniente dalla Somalia. [**Natural Trypanosomiasis observed at Milan in a Dog imported from Somaliland.**] — *La Nuova Veterinaria.* 1927. Sept. 15. Vol. 5. No. 9. pp. 209–212.

An account is given of the clinical symptoms presented by the dog—a fox-terrier. Rabbits, guineapigs, rats and mice were infected experimentally.

The author believes that the parasite was *T. evansi.*

BRITISH MUSEUM

KLIGLER (I. J.) & RABINOWITCH (G.). **Susceptibility and Resistance to Trypanosome Infections. III. The Relation of Dosage to the Course of Infection.**—*Ann. Trop. Med. & Parasit.* 1927. Oct. 10. Vol. 21. No. 3. pp. 375–380.

"The literature dealing with experimental studies of trypanosome infections in animals contains many diverse statements regarding the incubation period, course of infection, duration of illness, etc. These differences have been, as a rule, attributed to differences in virulence of the infecting organism. Often differentiation of species has been based on such differences in the manifestation of the reaction in experimental hosts."

The authors have found that the condition of the animal plays an important part in these variations. It would seem that variations are not necessarily due to differences in virulence.

The results of infecting animals with varying numbers of trypanosomes have been recorded. Doses ranged from some millions of trypanosomes to a few thousands, and in all cases there was an increase in the duration of illness as the dose was reduced.

Tests to show whether the effect of a given dose remains constant yielded confirmatory results.

LEDENTU (G.) & VAUCEL (M.). La formol-gélification dans la trypanosomiase humaine. [**The Formol-Gel Test in Human Trypanosomiasis.**]—*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 601–607.

The authors do not find the test to be of very great value in natives, but they have obtained some interesting results in sleeping sickness.

In untreated cases the gelification is very rapid in the first phase of the disease—a few minutes sufficing for the reaction to occur. It is somewhat slower during the second phase, and still slower, about 2 hours, in cases which present changes in the cerebro-spinal fluid without the presence of trypanosomes.

In treated cases the reaction occurs far more slowly and may not take place at all.

But a prognosis cannot be based upon the speed of the reaction. For example, trypanosomes may reappear in the blood when the reaction is negative, and on the other hand an increase in the speed of the reaction is not certainly an index of a relapse. In other words the reaction is of no value for the detection of relapses, nor for the confirmation of recovery. The test has, however, a certain presumptive value as a means of diagnosis.

In an area where the disease is endemic, to obtain a reaction in 30 minutes with the blood of a native raises a suspicion of trypanosomiasis and is an indication that thorough examination should be made.

In Europeans the method has a quasi-diagnostic value.

LE DENTU (G.). Quelques résultats éloignés du traitement de la maladie du sommeil par la tryparsamide. [**Results of Treatment of Sleeping Sickness with Tryparsamide.**]—*Ann. Inst. Pasteur.* 1927. Sept. Vol. 41. No. 9. pp. 982–1001.

The author records the results of treatment of patients in the second phase of trypanosomiasis who have received no treatment for at

least nine months. Sixty-four cases have been followed, and of these 40 have apparently recovered, 5 show improvement, 12 have relapsed, 4 show ocular lesions of long standing, and 3 have died. For an individual weighing 50 kg., about 25 g. of the drug are required.

Whereas atoxyl produces only a weak degree of arsenic resistance in trypanosomes, it is far more marked with tryparsamide. The relapses are thought to be due as a rule to insufficient treatment.

FARAG (Basili). Die Wirkung von Naganol (Bayer 205 vet.) auf *Trypanosoma dromedarum* in Aegypten. [**The Action of Naganol on *Trypanosoma dromedarum* in Egypt.**]—*Therapeut. Monatsheft.* 1927. Aug. Vol. 1. No. 2. pp. 33–36.

The author records the results obtained in two experiments involving the use of 11 rats in all. 1·5 mg. per 20 g. body-weight was found to be efficient.

SERGENT (Edm.), DONATIEN (A.), PARROT (L.), LESTOQUARD (F.) & PLANTUREUX (E.). Études expérimentales sur les piroplasmoses bovines d'Algérie (deuxième mémoire). [**Experimental Investigations of the Bovine Piroplasmoses of Algeria. (Second Memoir).**]—*Ann. Inst. Pasteur.* 1927. Nov. Vol. 41. No. 11. pp. 1175–1188. With 3 text figs.

In this paper the authors give a resumé of their campaigns against bovine piroplasmosis (sensu lato) during the period 1924–1927.

In 1924 a batch of animals "premunised" against piroplasmosis, babesiellosis, anaplasmosis and theileriasis, was exposed to natural infection. This batch comprised 46 animals, 34 imported from France and 12 either pure bred or cross bred animals born in Algeria. As controls there were 7 pure-bred animals imported from France and 56 Algerian country-breds or half-breds. Some of these were probably immunized by natural infection before they were utilized.

Of the French controls all died of theileriasis.

Of the Algerian controls 24 were sick and 13 died. Theileriasis was almost exclusively responsible.

Of the vaccinated animals two were attacked and both died. They were young calves which were just recovering from acute anaplasmosis when they became infected with Theileria.

1925.—During this year animals vaccinated in the field under ordinary conditions, animals vaccinated at the laboratory, and controls were exposed to natural infection.

Of 131 vaccinated 25 contracted theileriasis and 2 died.

Of 49 controls 46 became infected and 20 died. Again theileriasis was mainly responsible. Six of the controls were pure-bred French animals, and of these 5 died.

It is to be noted that vaccination was responsible for 8 per cent. of deaths.

1926.—271 animals of all kinds and ages were vaccinated in the field and exposed to natural infection. The inoculations were carried out in three groups, with a mortality of 2·6 per cent.

Some of the animals were dealt with in hill country, and the remainder on low-lying land.

Of 271 on the low ground 84 were vaccinated against all four diseases and 187 against theileriasis only. Nine country-bred calves served as controls. The mortality, from theileriasis, among the vaccinated was 1·8 per cent., and 5 of the 9 controls died of the same disease.

It is noted that stalled milch cows of the fine breeds may react violently to vaccination.

1927.—506 animals of all kinds were exposed to natural infection. About a half of them had been vaccinated under field conditions for the first time and the remainder were re-vaccinated. These had already been exposed to infection in 1926.

The animals were inoculated in two batches. The first comprised 445 animals and each of these received blood containing piroplasma, babesiella, and anaplasma. Owing to a delay in transport the mixed viruses were exposed to ordinary external temperatures for two days. The vaccination produced no incident worthy of note, and there were no deaths.

At the second inoculation 474 animals were vaccinated against Theileria. Of these 427 had been vaccinated or revaccinated. Two animals developed severe reactions and died.

506 animals were exposed to infection in the plains during 1927. 471 had been vaccinated in the field and 35 at the laboratory. 424 had been vaccinated against all four organisms, and 82 against Theileria alone. There were 11 controls. Three vaccinated animals died of theileriasis and 5 of the controls.

In carrying out the vaccination experience has shown that inoculation with piroplasma, babesiella, and anaplasma can be done at one time. The reaction to the first two is subsiding when that due to anaplasma is beginning.

There should be an interval of three months before the inoculation with Theileria is carried out.

Although in most cases the vaccinations are not marked by any untoward incident, watch must be kept for accidents.

It is recommended that animals be treated as young as possible, because in them the reactions are almost always weak. It is advisable to repeat the inoculations annually.

Each type of parasite is supplied by an animal having a pure infection. In the case of *P. bigeminum* and *B. bovis* the blood is obtained from an animal that has been infected not less than 3 months and not more than a year previously. The doses are 2–10 cc. and 5–10 cc. respectively. The Anaplasma virus vaccine is obtained from an animal still in the incubation stage, that is to say, 5 to 6 days after it has been inoculated from a chronic case. The theileria vaccine-virus is blood taken from animals in the acute stage, when blue bodies are present in the liver in large numbers. This virus-vaccine retains its efficacy for at least 48 hours at ordinary temperature (18° C.).

The Theileria virus is maintained at the laboratory by passage through pure-bred French animals. Two are inoculated, each time, and the inoculations are carried out at intervals of 17 to 20 days.

BROCHET. Piroplasmose et hémoglobinurie. [**Piroplasmosis and Haemoglobinuria.**]—*Rev. Gén. Méd. Vét.* 1927. Sept. 15. Vol. 36. No. 429. pp. 507–508.

The author of this note is in Persia. He states that equine piroplasmosis is not very rare, but that the infection is usually a latent one

in the native horses. The disease may, however, become obvious when some other influence arises. In such cases haemoglobinuria is the most prominent symptom. This makes its appearance suddenly, persists for a few days, and then disappears again. He issues a note of warning against the automatic diagnosis of all cases of haemoglobinuria as being piroplasmoses, and details a case which was really one of the so-called Azoturea.

CUILLÉ (J.) & DARRASPEN (E.). Formes atypiques et formes chroniques de la piroplasmose du chien. [**Atypical and Chronic Forms of Canine Piroplasmosis.**]—*Rev. Gén. Méd. Vét.* 1927. Aug. Vol. 36. No. 428. pp. 433–443.

The authors hold that in the past errors of diagnosis have been made as a result of insufficient examination of blood smears. NOCARD pointed out in 1902 that a negative result of the examination of the blood on two or three days is not sufficient to warrant a negative diagnosis.

As a result of their own observations, which have been made during the last three years, the authors are in a position to state that canine piroplasmosis occurs far more frequently in the neighbourhood of Toulouse than has been thought. They quote the figures from the Statistics of the Veterinary College at Toulouse showing that between 1910 and 1926 (omitting the war period) the number of cases detected rose from 2 to 41.

They have been struck with the variations in the symptoms present, and they are certain that the majority of the diseases would not have been definitely diagnosed but for careful and persistent examination of the blood in all cases showing anaemia and discoloration of the urine.

The abnormal symptoms which may mask the classical symptoms of the disease involve the respiratory, digestive, nervous, or muscular systems.

Apart from these acute atypical cases, there are chronic cases in which diagnosis is extremely difficult, but a symptom which is rarely absent is the white porcelain appearance of the mucous membranes. Bile staining is exceptional.

The examination of the urine is of great importance. Bile pigments may be detected, and rarely haemoglobin. Bile salts are almost invariably absent. Corneal opacity may be found.

It is suggested that some of these abnormal cases of the disease are really due to a combination of bacterial and protozoal infections, but the authors state that they have not found any evidence that this is so.

YAKIMOFF (W. L.). La lutte antipiroplasmique dans le gouvernement de Pétrograde (Léningrade) en 1926. (Note préliminaire). [**The Anti-Piroplasmosis Campaign in Petrograd in 1926.**]—*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 595–597.

During 1926 the disease was very severe, mortality reaching 50 to 60 per cent. Shortage of food during the winter and spring was partly responsible for this.

A tabular statement shows the numbers of native and imported animals which were treated with various drugs and combinations of them. Of 608 animals treated 61 died. Of those treated with ichthargan 7·1 per cent. died. It is to be noted that nearly half the total number were treated with this drug.

YAKIMOFF (W. L.), WASSILEWSKY (W. J.) & MARKOFF-PETRASCHEWSKY (E. N.). Zur Frage der Blutveränderungen bei Rinder-Piroplasmose. [**The Blood Changes in Bovine Piroplasmosis.**]—*Arch. f. Wissenschaft. u. Prakt. Tierheilkunde.* 1927. Oct. 26. Vol. 56. No. 5. pp. 452–475.

Cattle infected with *B. bovis* show the following changes in the corpuscular elements of the blood.

(*a*) A reduction in the number of red corpuscles, and histological changes in them.

(*b*) An alteration in the leucocyte formula involving an increase in the mononuclears and a reduction in the neutrophile polynuclears, together with the appearance of abnormal forms.

(*c*) A displacement of Arneth's formula to the left.

The authors publish their observations on the blood changes in 743 animals infected with piroplasmoses, with that of 100 healthy animals as controls.

They tabulate the enumerations of the white and red blood corpuscles given by various writers and then give a number of tables showing counts of normal and infected blood, the latter at different stages of the disease and in some cases after treatment with various drugs.

Their conclusions are given above.

YAKIMOFF (W. L.), MARKOFF-PETRASCHEWSKY & RASTEGAIEFF (E. F.). Über die Bedeutung der Polychromatophilie, und der getüpfelten Erythrozyten bei Babesiellosis des Rindes. [**The Significance of Polychromatophilia and Stippled Red Corpuscles in Bovine Babesiellosis.**]—*Deut. Tierärzt. Woch.* 1927. Oct. 29. Vol. 35. No. 44. pp. 712–714.

The authors have carried out examinations of blood films of 27 animals affected with Babesiellosis. They found that in 8 out of 17 polychromatophilia made its appearance before punctate basophilia. In the remaining 9 both types of corpuscles appeared simultaneously.

In naturally-contracted cases the punctate basophilia appears 3 or 4 days after the urine has become blood tinged. They believe that the appearance of the corpuscles has some prognostic value.

DE ASÚA (F. J.), DIOS (R. L.), ZUCCARINI (J. A.) & KUHN (M. J.). Studien zur Tristezafrage [**Tristeza.**]—*Beiheft. z. Arch. f. Schiffs- u. Trop. Hyg.* 1927. Vol. 31. No. 5. pp. 5–34.

The authors began their work by making a systematic examination of the blood of normal cattle.

They found the number of red corpuscles to range from 6 to 12 million, with an average of ten. The haemoglobin content varied from 65 to 37 with an average of 57 (Sahli).

The red corpuscles were less resistant to hypotonic salt solution than those of man.

In films stained by May-Grünwald-Giemsa a variable amount of anisocytosis was detected. A small number of Jolly bodies may be present in the blood of normal animals. Vital staining with brilliant-cresyl-blue reveals no granulo-filamentous or metachromatic substance in the red corpuscles.

The number of leucocytes ranged from 7,200 to 16,800, with an average, taken from 32 counts, of 11,500.

Three types of leucocytes are recognisable in smears stained with May-Grünwald-Giemsa—granular leucocytes, lymphocytes, and monocytes.

The granular leucocytes are of three kinds: The small neutrophile granular forms, those containing eosinophile granules, and those with basophil granules. The latter frequently appear to resemble degenerated leucocytes.

Two kinds of lymphocytes occur, but they were enumerated together; namely, smaller forms which closely resemble the lymphocytes of man, and larger ones which were sometimes difficult to distinguish from Monocytes.

The monocytes resemble those of man's blood, but are rather larger.

The enumeration of the forms yielded the following figures.

	Average.	Maximum.	Minimum.
Leucocytes with small granules ...	34·5	54·0	22·0
,, ,, eosinophile granules	1·0	6·0	0
,, ,, basophile granules	0·25	0·5	0
Lymphocytes	58·25	71·5	38·0
monocytes	6·0	10·5	3·5

The animals were infected by intravenous inoculation with blood taken from animals at different stages of infection, and subsequently blood smears and "thick drops" of blood were prepared daily in order to detect changes in the numbers of parasites present.

At these blood examinations the red corpuscles were enumerated, their osmotic resistance to hypotonic salt, vital staining with brilliant cresyl blue, changes in the red corpuscles in stained smears, and the number of white corpuscles were determined.

The incubation stage, after intravenous inoculation, ranges from 3 to 5 days, and parasites multiply rapidly in the blood and reach a maximum 5 to 8 days after inoculation. There is a rapid reduction in the number of red corpuscles. This may amount to as much as 4 million on the day when parasites are most numerous. There is also a reduction in osmotic resistance. The sudden haemolysis is shown by marked haemoglobinuria with large quantities of urobilin and urobilinogen in the urine. The maximum degree of haemoglobinuria coincides with the maximum number of parasites in the blood. The production of both red and white corpuscles is in abeyance for a time, and leucopenia is one of the most constant symptoms of the disease.

When death takes place at this stage, it is due in the authors' opinion to heart failure and not to the acute anaemia. If the animal survives there is a rapid diminution in the number of parasites. On the 6th to 8th day the animal body attempts to repair the blood lesions by a very rapid production of red corpuscles, and the abnormal forms associated with this type of anaemia make their appearance. These, however, are not produced as a rule in sufficient numbers to compensate for the reduction, and the oligocythaemia persists until the 9th to 15th day.

Recovery from the disease begins about the end of the second or third week. During this period the cell count of the blood slowly approaches the normal, and the haemoglobin content is restored, or may even exceed the normal.

In anaplasmosis the symptoms appear first when recovery from piroplasmosis is nearing completion, that is to say, on the 20th to 30th day. This results in an interruption of the regeneration of the blood. There is a second fall in the number of red corpuscles. Haemoglobinaemia and haemoglobinuria are not observed, but bilirubinaemia and urobilinuria are recognizable. There is no reduction in the number of white corpuscles, but actually an increase.

Recovery from anaplasmosis is very slow. The author has had cases under observation in which the blood had not returned to the normal three months after the attack. The author emphasizes a distinction between piroplasmosis and anaplasmosis by pointing out that in the former the invasion of the blood by parasites is much more rapid than in the latter.

The macroscopic and microscopic characters of the lesions are briefly described, and the changes occurring in the haematopoietic system are dealt with at some length.

As a result of the blood destruction the reticulo-endothelial system shows pronounced changes. Sections of the spleen, during the early days of infection show pronounced hyperaemia and richness in pulp cells. The monocytes form a kind of zone around the follicles, but do not penetrate into them. These cells never reach a large size. They occur in the intralobular capillaries of the liver, but it is not known whether these are derived from the spleen or produced locally.

Pigments derived from haemoglobin occur in the spleen and elsewhere. In the spleen it occurs in the pulp cells, but it is also found in Kupffer's cells, the interfollicular cells of the lymph glands, and the perivascular cells of the kidneys. Nothing definite is known regarding the nature of the pigment. Haemosiderin also occurs in the cells of the reticulo-endothelial system where it is present as yellow rounded granules of various sizes. This pigment is distributed through the protoplasm.

The extensive destruction of the red corpuscles leads to the formation of haemoglobin cylinders in the renal tubules, and stasis in the bile capillaries in the liver.

In the lymphoid system only slight changes are observed. Of these the most pronounced is an apparent reduction and deformation of the cells of which the Malphigian bodies are composed. This is possibly a purely passive phenomenon. Little of special importance is to be seen in the bone marrow.

The authors draw special attention to cells which are to be found in smears from the liver, spleen, and lymph glands. These are rounded cells from 3 to 15μ in diameter which contain balls or masses of a substance which stains in a manner resembling chromatin staining. The significance or nature of these is not known, but the authors state that they have found similar cells in smears from the organs of dogs poisoned with haemolytic poisons. In a chapter devoted to a consideration of the cause of Tristeza the authors review the various theories that have been put forward regarding the nature, etc., of anaplasms, and they appear to favour the view that anasplasms are not in reality parasites, but only symptoms, so to speak. The authors also discuss at some length the influence of the reticulo-endothelial system upon the course of the disease, but they reach no definite conclusions.

NOELL (R.). Le trypanbleu dans le traitement de la piroplasmose vraie. [**Trypanblue in the Treatment of True Piroplasmosis.**]—*Rec. Méd. Vét.* 1927. Sept. 15. Vol. 103. No. 16. pp. 529–530.

The author has frequently noticed that trypanblue in doses of 1 g. per 100 kilos given to animals at the height of an attack of piroplasmosis may lead to alarming clinical symptoms. To obviate this LESTOQUARD and DONATIEN advise much smaller doses.

Noell has recently had an opportunity of testing the smaller doses on a case of true piroplasmosis in a mare.

The diagnosis was confirmed by microscopic examination, but prolonged search was required for the detection of the organism. 25 cg. of trypanblue were given dissolved in 30 cc. of distilled water. Clinical symptoms of a mild nature appeared almost immediately, but these passed off in about a quarter of an hour. There was an uninterrupted recovery.

LEGG (John). **Can the Cattle Tick** *Haemaphysalis bispinosa* **act as the Carrier of Piroplasmosis** (*Piroplasma bigeminum*)**?**—*Austral. Jl. Exp. Biol. & Med. Sci.* 1926. Dec. Vol. 3. No. 4. pp. 203–216.

Experiments failed to produce any evidence that *H. bispinosa* can convey *B. bigeminum.* Ticks in all stages of development were fed upon recently recovered animals, were allowed to engorge upon susceptible animals, but failed to transmit the infection. The animals used were subsequently infected by inoculation.

HIBINA (A. M.). Coccidiosis bij het Rund. [**Coccidiosis in the Ox.**]—*Tijdsch. v. Diergeneesk.* 1927. Oct. 15. Vol. 54. No. 20. pp. 945–947. Author's English Summary.

The author finds that spontaneous recovery occurs in both slight and severe cases. Treatment is of value only in the early stages when the animals are still resistant and blood has not appeared in the faeces. He used tannoform.

YAKIMOFF (W. L.). Le traitement de la coccidiose des bovidés par l'ichtargan. [**The Treatment of Bovine Coccidiosis by Ichthargan.**]—*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 588–589.

Infected animals are treated with 1 gramme dissolved in 1 litre of water (not in salt solution) twice daily. The author claims that he has treated several dozen animals with success in every instance. Two or three days suffice to effect a cure.

One case is specifically referred to and in this instance 3 species of coccidium were recognisable in the faeces—*E. zürni, E. smithi,* and a third of large size.

ANDREWS (Justin M.). **Host-Parasite Specificity in the Coccidia of Mammals.**—*Jl. Parasitology.* 1927. Mar. Vol. 13. No. 3. pp. 183–194.

In carrying out cross infectivity tests three points must be borne in mind, viz., the natural coccidial parasites of the animals, the interference of an acquired immunity, and mechanical carriage. The

author holds that infection confers an appreciable immunity save in the case of the rabbit, where continual re-infestations are held to occur.

Summarizing the literature the author finds that it is a very general rule that cross infectivity tests do not succeed. Details of experiments are given the results of which tend to indicate that *I. felis* and *I. rivolta* are infective for both the cat and the dog.

Selective digestion appears to be a factor in the mechanism of host-parasite specificity, for the results indicated that in a foreign host sporozoites are not released from ingested oocysts.

HOARE (C. A.). **On the Coccidia of the Ferret.**—*Ann. Trop. Med. & Parasit.* 1927. Oct. 10. Vol. 21. No. 3. pp. 313–317. With 2 plates.

The author describes the exogenous stages of two species of *Eimeria* and one of *Isospora* found in ferrets. The former were more frequently encountered. Infection did not appear to be responsible for ill-health in any way.

Isospora laidlawi, n. sp. Only 35 to 40 specimens of this parasite have been seen. They ranged from 32μ to 36·8μ in length by 27·2μ to 30·4μ in breadth. Development at room temperature in 0·5 per cent. chromic acid required four days. There is no oocyst residual body, but a large sporocyst residual body.

In the sporocyst the sporozoites are arranged all lying in one direction and not "head to tail." The author gives his reasons for concluding that the parasite is a distinct species.

The two forms of *Eimeria* were found in a fair proportion of the animals examined and always in large numbers.

The large parasite measured 18·4μ to 27·2μ by 12·8μ to 20·8μ, and the zygote in the freshly passed parasite is rather elongated, measuring about 15μ by 12μ, but later becomes spherical.

There is no residual body in the oocyst, but there is a large granular one in the sporocyst. In an experiment oocysts appeared in the faeces 7 days after feeding with sporulated oocysts. The name *E. ictidea* is suggested. The second *Eimeria* was a more or less spherical one ranging from 11·2μ to 14·4μ by 10·4μ to 12·8μ. Complete development requires 5 to 6 days. There appears to be no oocystic residual body, but there is a small one in the sporocyst.

Oocysts were passed 6 days after feeding. The name *E. furonis* is suggested.

BLANC (Georges) & CAMINOPETROS (J.). Nouvelle enquête sur la répartition du Bouton d'Orient en Grèce. Un foyer continental en Laconie-Péloponèse. [**An Inquiry into the Distribution of Oriental Sore in Greece.**]—*Ann. Inst. Pasteur.* 1927. Sept. Vol. 41. No. 9. pp. 1002–1021. With 3 text figs.

The author finds that there is an area in Laconia where the disease is endemic and where it has probably existed for a long time; it certainly appears to have been present before the influx of refugees from Asia Minor.

REES (C. W.). **Balantidia from Pigs and Guinea-pigs: their Viability, Cyst Production and Cultivation.**—*Science.* 1927. July 22. Vol. 76. No. 1699. pp. 89–91.

The trophozoites of Balantidia from pigs remain normal in appearance and reactions when cooled to room temperature, and they may remain alive for 10 days in this condition. This is contrary to the findings of MCDONALD.

Trophozoites that infect the pig may pass through the stomach of the guineapig and reach the caecum, where they are normal after 18 hours. Trophozoites are frequently passed in the faeces, but the factors determining cyst production are not known. Barret and Yarbrough's medium can be used for cultivation. The addition of rice starch improves the medium, and it is an advantage to replace the 0·5 per cent. sodium chloride with Ringer prepared without dextrose. Sulphuretted hydrogen appears to be non-toxic to the Balantidium of the pig.

KLARENBEEK (A.). Een Leptospirose als oorzaak van Icterus van den Hond. [**A Leptospira as a Cause of Jaundice in the Dog.**]—*Tijdsch. v. Diergeneesk.* 1927. Nov. 15. Vol. 54. No. 22. pp. 1041–1046.

The author confirms the occurrence of a form of jaundice in dogs caused by a leptospira.

In his English summary he states that in his experience the disease most frequently occurs in dogs less than two years old. The symptoms are dullness, jaundice, haemorrhages of the skin, mucous membranes and other organs, particularly the lungs. There is often vomiting, and the faeces contain blood.

The spirochaete can be found by microscopic examination in the blood and in the kidneys.

The parasite is transmissible to the guineapig by inoculation. The blood of an infected dog agglutinated a leptospira recovered from a man suffering from Weil's disease in a dilution of 1 in 50,000.

KLARENBEEK (A.). Présence de spirochètes du type *Leptospira* dans les reins des chiens atteints d'ictère et de fièvre typhoïde. [**The Presence of Spirochaetes of the Leptospira Type in the Kidneys of Dogs affected with Jaundice and Typhoid Fever.**]—*Ann. Inst. Pasteur.* 1927. Nov. Vol. 41. No. 11. pp. 1156–1165. With 5 text figs.

The author figures and describes spirochaetes detected by silver impregnation technique in the epithelial cells and in the lumen of the renal tubules in cases of jaundice and of Stuttgart disease.

He gives a guarded opinion as to whether these represent the actual causes of the condition.

WILBERT (R.) & DELORME (M.). Sur une spirochétose ictéro-hémorragique du chimpanzé transmissible à l'homme. [**An Ictero-Haemorrhagic Spirochaetosis of the Chimpanzee transmissible to Man.**]—*Ann. Inst. Pasteur.* 1927. Nov. Vol. 41. No. 11. pp. 1139–1155.

The spirochaete was detected in a number of chimpanzees which died (23 out of 24) as the result of a veritable epidemic of the disease.

The first case occurred in a chimpanzee imported from the Ivory Coast, and having spread through this batch it extended to others which had been obtained from other parts of West Africa. In the early part of the epidemic the disease ran its course in 1 to 4 days, but the later cases ran from 4 to 11 days.

A full account of the symptoms is given. The manner in which the disease was spread has not been elucidated. A number of attempts were made to transmit the infection to other species, but success was achieved in one series of guineapigs and with two chimpanzees only. One of the authors (Wilbert) contracted the disease. An account of his symptoms is given, and the infection was transmitted from him to a chimpanzee by inoculation. The chimpanzee died. Wilbert has no recollection of having wounded himself during post-mortem work, but he was constantly being bitten by anopheles and stegomyia.

No treatment of the chimpanzees was found that was of any value.

GWÉLESSIANY (J.). Recherches sur le passage des spirochètes à travers les muqueuses et la marche des infections mixtes spirochéto-trypanosomiennes. [**The Passage of Spirochaetes through Mucous Membranes, and the Course of Mixed Spirochaete-Trypanosome Infections.**]—*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 653–664.

The author questions whether a good deal of the work carried out in connexion with this subject holds good because there is a possibility that the technique employed by various authors has not left the mucous membrane or the skin, as the case may be, actually intact.

As indicating the probability that the spirochaete of relapsing fever can infect through sound mucous membranes the author recounts the incident recorded by SERGENT in 1913 when two out of three persons were accidentally infected through having infective blood splashed on their faces. The third persons possibly owed his escape to the fact that he wore glasses.

Experiments were carried out with spirochaetes and trypanosomes either separately or together. In one experiment in which *T. brucei* and *Treponema duttoni* were placed in the eye and in the mouth without touching the tissues in any way, so as to avoid the slightest injury, 10 mice were used. All became infected with the spirochaete, but only two with the trypanosome.

This experiment was repeated. Again, all of the mice contracted spirochaetosis, but in this case none became infected with the trypanosome.

T. equiperdum and *Treponema crocidurae* were used for an exactly similar experiment. None became infected with the trypanosome.

DESCHIENS (R.), LIMOUSIN (H.) & TROISIC (J.). Eléments présentant les caractères d'un protozoaire sanguicole observés chez le chimpanzé. [**Structures possessing the Characters of a Protozoon in the Blood of a Chimpanzee.**]—*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 597–600. With 1 text fig.

The first observation of this type of body in the blood of a chimpanzee was made in December 1925, but it was thought advisable that confirmation should be obtained before anything was published.

DELORME, of the Pasteur Institute of Kindia, to whom the authors showed a photograph of their blood film, stated that he had seen identical bodies in blood smears from chimpanzees.

In a blood film stained with May-Grünwald-Giemsa the structure appears as a vermiform body with square-cut ends measuring 21μ by 1μ. At one end there are two granules separated by a clear area and staining a purple-red colour. Posterior to these are two masses measuring 8μ and 5μ in length and also separated by a clear area. Posteriorly again there is a clear area.

The possibility of its being a foreign body superposed upon the film is discounted by the fact that it is in the same plane with the red corpuscles. And the observation of DELORME indicates that it is not a contamination of the drop of blood used for spreading.

The authors survey the possibilities as to what the structure may be and come to the conclusion that though it differs to a somewhat considerable extent from that body, it most closely resembles *Sergentella hominis* (Brumpt 1903), and in the meantime they name it *Sergentella anthropopitheci*.

QUÉMÉNER (E.). Contribution à l'étude de la " formol-gélification " dans la syphilis et le kala-azar. [**The Formol-Gel Test in Syphilis and Kala Azar.**]—*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 600–601.

The authors state that in carrying out this test they have observed that the rate of separation of serum from clot appears to vary with the virulence of the infection. In badly infected cases this takes place in two hours, and longer in less severe cases.

At ordinary temperatures reactions are generally clear in 24 hours; but strongly positive ones in 15 minutes.

The reaction is negative for 25 days after the appearance of chancre or in syphilitics under treatment. It is positive in about 50 per cent. of secondary or tertiary syphilis, and always positive in untreated cases of kala azar.

The conclusions are based upon 200 cases.

FRANCHINI (G.). Su di un plasmodio pigmentato di una scimmia. [**A Pigmented Plasmodium in a Monkey.**]—*Arch. Ital. Sci. Med. Colon.* 1927. April. Vol. 8. No. 4. pp. 187–190. With 1 plate.

FRANCHINI (G.) & CADEDDU (A.). Su di una trypanosomiasi dei cammelli a Giarabub in Cirenaica. (Seconda nota.) [**Trypanosomiasis of Camels at Giarabub in Cyrenaica.**]—*Arch. Ital. Sci. Med. Colon.* 1927. April. Vol. 8. No. 4. pp. 191–193.

DISEASES DUE TO METAZOAN PARASITES.

PETER. Eine wirksame Methode zur Bekämpfung der Dasselfliegenplage. [**A Practical Method of combating the Gad-fly.**]—*Berlin. Tierärzl. Woch.* 1927. Nov. 18. Vol. 43. No. 46. pp. 769–773.

The author introduces his subject by pointing out that none of the methods of attacking this pest are completely satisfactory. Certain oily preparations are credited with being efficacious as a result of

closure of the tracheal openings. In the author's view, if that alone was responsible for the success obtained, any fat or oil should be equally effective. This is not the case.

Peter obtained some evidence that the specific action of one of these oils was due, at least in part, to absorption of the phenol contained in it. An ointment was compounded by a commercial firm for the author's use, but the composition is not given.

It is claimed that the ointment not only kills the larvae in all stages of their development under the skin, but also greatly assists the healing of the lesions which result from the invasion.

The ointment is rubbed in three times, with an interval of three days between each. Many of the larvae which have been killed are said to be evacuated from the subcutaneous tissue during the process of inunction.

BROCHET. Larves d'hypodermes chez le chevre à Téhéran. [**Hypoderma Larvae in Goats in Teheran.**]—*Rev. Gén. Méd. Vét.* 1927. Sept. 15. Vol. 36. No. 429. pp. 508.

Although it is generally held that hypodermosis is of rare occurrence in the goat, the author states that it is very frequently detected at the abattoir at Teheran during the autumn. Approximately one-third of the carcases are so parasitized with 20 to 30 parasites each. By December most of the larvae have made their escape.

The larvae are whitish in colour and measure about 13 mm. long by 2·5 mm. in diameter. They show 10 double rows of spines. The stigmatic plate shows two large black spots.

The author has no information about the imago.

PETER. Weitere Untersuchung chemische Präparate auf ihre Brauchbarkeit im Kampfe gegen die Dasselfliegenlarve. [**Further Experiment with Chemical Substances in the Control of Bot-fly Larvae.**]—*Berlin. Tierärzt. Woch.* 1927. Sept. 30. Vol. 43. No. 39. pp. 645–648.

The author gives tabular statements showing the effects of a number of substances containing sulphur and chlorine, naphthalin, and some mixtures containing tobacco upon larvae expressed from skin lesions. None of these was very satisfactory.

DUNN (L. H.). **Notes on Two Species of South American Ticks, *Ornithodorus talaje* Guerin-Mene., and *Ornithodorus venezuelensis* Brumpt.**—*Jl. Parasitology.* 1927. March. Vol. 13. No. 3. pp. 177–182.

These ticks are shown to be capable of transmitting relapsing fever, and it is believed that the latter is the principal agent in tropical America.

The larvae of *O. talaje* are commonly found on rats, and presumably the other stages infest animals. Man is apparently only a host of necessity.

GRANOUILLIT, THU & KHOAN. Contribution à l'étude de la résistance des oeufs et des larves hexapodes d'Ixodidés à l'action des vapeurs d'antiseptiques.—Utilisation pratique des vapeurs d'ammoniaque. [**The Resistance of the Eggs and Hexapod Larvae of the Ixodidae to the Action of Antiseptic Vapours. Practical Utilization of Ammoniacal Vapours.**]—*Rev. Vét. et Jl. Méd. Vét.* 1927. Nov. Vol. 79. pp. 615–619.

Large numbers of ticks (Haemaphysalis) in all stages were collected in sterile tubes. It was found that the larvae died in 20–25 days, the nymphs in 25 to 28 days, and the adults in 30 to 33 days.

Female ticks were placed in pipettes with a bulb which were closed at the upper end with cotton wool. Larvae hatched out in 22 to 25 days. In pipettes containing a little sterile water at the lower end hatching was hastened somewhat. In the experiments described pipettes with two bulbs, about 15 centimetres apart were used. About 1 cc. of the antiseptic selected was placed in the lower bulb and the end of the tube was sealed. The eggs were introduced into the upper bulb and the tube was then plugged.

Ether, " mentholated oil," " formalized water," petroleum, carbolic acid, nitric acid, and ammonia were tried. Carbolic acid and ammonia alone prevented hatching.

These were then tested for varying lengths of time, and it was found that ammonia prevented hatching when exposure was for only an hour. Hatching occurred after exposure to the vapour of carbolic acid for one hour.

In a second experiment ammonia vapour was found to be fatal to hexapod larvae in 4 minutes.

The vapour has not the same effect upon the adult.

GROZA (Marian P.). Distomatoza ovina. Si tratamentului cu Distol, Serapis, Filinol si Parazitin. [**Ovine Distomatosis, Treatment with Distol, Serapis, Filinol and Parazitin.**]—*Arch. Véterinaria.* 1927. Vol. 20. No. 1-2. pp. 3–53. [Author's French Summary.]

Distol may be considered as a specific in distomatosis. In the dose prescribed it is non-toxic and safe. All the parasites are destroyed, and it does not cause abortion.

Only one death occurred among 351 lambs treated, and in this case the animal was probably too far gone to be treated with success.

Distol is without effect upon *D. lanceolatum.*

Serapis Sb 444. The therapeutic dose of this drug sometimes produces marked systemic disturbance. If used on advanced cases it may prove toxic, and provoke a mortality up to 11 per cent. In the doses prescribed it is not certainly fatal to all the parasites present. It does not cause abortion. There is some evidence to suggest that it has a noxious effect upon *D. lanceolatum.*

Filinol in therapeutic doses causes severe systemic disturbance, and there may be a mortality of more than 25 per cent. in advanced cases. The drug is fatal to Fasciola, but is without effect upon Dicrocoelium. Abortion occurred in three pregnant ewes.

Parazitin caused diarrhoea and loss of condition. The medicinal dose approximates to the toxic dose, and a 30 per cent. mortality may occur. It is fatal to nearly all the Fasciola present, but is without effect upon Dicrocoelium. Two pregnant sheep aborted.

MAREK (J.). Neuere Beiträge zur Kenntuis der Leberegelkrankheit, mit besonderer Berücksichtigung der Infektionsweise, der Entwicklung der Distomen und der Therapie. [**Recent Additions to Knowledge regarding Fluke Disease, with Special Reference to the Methods of Infection, Development and Treatment.**]—*Deut. Tierärzt. Woch.* 1927. Aug. Vol. 35. No. 32. pp. 513–519.

The author brings evidence to show that in wet years encapsuled cercariae can persist in hay for eight months and possibly longer, and cause a fatal infection when the hay is fed.

He is not of the opinion that invasion of the liver is direct from the peritoneal cavity. In his view, this invasion takes place via the portal blood vessels. The flukes require about three months to come to maturity in the liver.

Experiments with a modified form of " Distol " are described. This drug was effective when capsules were given on four consecutive days in some 80 per cent. of cases.

DE BLIECK (L.) & BAUDET (E. A. R. F.). Tetrachloorkoolstof als Middeltegen Distomatosis bij Schapen. [**Carbon Tetrachloride for Distomatosis in Sheep.**]—*Tijdsch. v. Diergeneesk.* 1927. Sept. 1. Vol. 54. No. 17. pp. 825–830.

The author finds that a dose of 1 cc. is efficient, and he does not appear to have experienced any untoward results. Emphasis is laid upon the necessity of having the pure drug. The best times for treatment are July, October, December and February.

GERMAN (S.) & PAPKOVA (L.). **Infestation of Camels by Trichostrongylus in Saratovsky Region.**—*Rev. Microbiol. et Epidémiol.* 1927. Vol. 6. No. 2. English summary. pp. 261–262. [In Russian, pp. 182-183].

The authors examined the faeces of 34 camels and found Trichostrongylus eggs in all of them. The technique of KOFOID & BABER was used.

It is not clear whether any post-mortem examinations were carried out. There is no specific identification of the worm.

FOLEY (H.), CATANEI (A.) & VIALATTE (Ch.). Microfilaires du sang de quelques animaux d'Algérie. [**Microfilariae in the Blood of Certain Animals in Algeria.**]—*Arch. Inst. Pasteur d'Algérie.* 1926. Dec. Vol. 4. No. 4. pp. 485–518. With 7 plates & 6 text figs.

Microfilariae have been found in the blood of lizards, birds and domesticated animals in the Saharan portion of Algeria.

The study of these worms is fraught with some difficulty for many reasons. It must not be assumed that only one species is present, the adult worm must be found and the embryos present in the blood must be compared with those in the terminal part of the uterus of the female. The animal host must be specifically identified.

Nevertheless, observations, records, and measurements as accurate as possible must be made when microfilariae are discovered by chance

in the blood of animals. In this paper the authors figure and describe microfilariae from the following animals: (1) *Tarentola mauritanica*, *Uromastix acanthinurus*, sparrow, *Elephantulus deserti*, hare, dog, (*M. immitis*, *M. auquieri*), horse, donkey, dromedary.

A ROYO (C.). Un caso de habronemosis con eosinofilia hemática (Nota preliminar). [**A Case of Habronemiasis with Eosinophilia in the Blood.**]—*Revist. Hig. y Sanidad Pecuarias.* 1927. Oct. Vol. 17. No. 10. pp. 735–736.

CHARRIER (H.). Note préliminaire sur les mouches de la région de Tanger. [**The Flies of the Tangier Region. A Preliminary Note.**]—*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 619–622.

HENRY (A.) & LESBOUYRIES. Strongle des vaisseaux dans l'oeil d'un chien. [*Haemostrongylus vasorum* **in the Eye of a Dog.**]—*Rec. Méd. Vét.* 1927. July 30. Vol. 103. No. 14. pp. 263–265.

HOEPPLI (R.). Ueber Beziehungen zwischen dem biologischen verhalten parasitischer Nematoden und histologischen Reaktionen des Wirbeltierkörpers. [**The Relationship between the Biological Characters of Parasitic Nematodes and the Histological Reactions of the Animal Host.**]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1927. Vol. 31. No. 3. 88 pp. With 24 figs. in text & 1 coloured plate.

MARX (Alberta). *Trigonomonas diplostomum*, **n. sp. from the Intestine of the Frog.**—*Jl. Parasitology.* 1927. March. Vol. 13. No. 3. pp. 173–176. With 1 plate.

ROSS (I. Clunies). **A Clinical Note on Habronemiasis in Australia.**—*Vet. Jl.* 1927. Oct. Vol. 83. No. 10. pp. 516–521.

SKRJABIN (K. I.) & ISAITSCHIKOFF (I. M.). **Four New Species of the Family** *Dicrocoeliidae* **from the Livers of Birds.**—*Ann. Trop. Med. & Parasit.* 1927. Oct 10. Vol. 21. No. 3. pp. 303–12. With 212 plates.

TUBANGUI (M. A.). **Worm Parasites of Philippine Chickens.** [Reprint from *Philipp. Agric. Rev.* 1926. Vol. 19. No. 4. 43 pp. With 19 figs. & 2 plates.

BACTERIAL DISEASES.

CARPENTER (C. M.) & PARSHALL (C. J.). **A Study of Milk from Cows showing no Agglutinins for** *Brucella abortus* **in their Blood Serum.** —*Cornell Vet.* 1927. Apr. Vol. 17. No. 2. pp. 234–235.

The authors have carried out tests "to find out whether, if the blood serum from a cow is negative and she has not aborted or had retained placenta, her udder will be free from *Brucella abortus* infection, especially when she is constantly in contact with animals harbouring the disease."

The authors consider complete agglutination in 1 in 60 with serum as indicative of infection.

The following technique was adopted:

Half a pint of milk was centrifuged at high speed for 20 minutes. The layer of cream was removed and placed in sterile Petri dishes. The remaining liquid was discarded and the sediment saved. One guineapig was inoculated with 1 cc. of cream and one with 1 cc. of sediment; the guineapigs were examined from 6 to 12 weeks later.

Cultures were made from the spleens, and blood was collected for an agglutination test.

Milks from eighteen animals were used. These all gave negative results to agglutination tests, and all had a normal breeding record although they had been associating with a group of infected cows for two or three years. In no case was any evidence of infection of the udder obtained.

CARPENTER (C. M.) & BAKER (D. W.). **A Study of** *Brucella abortus* **Infection in Milk from Fifty Herds supplying the City of Ithaca, New York.**—*Cornell Vet.* 1927. Apr. Vol. 17. No. 2. pp. 236–247.

The authors' investigations have been prompted by the diagnosis of a number of cases of illness in human beings as due to *Brucella abortus*. The examinations involved market samples from 50 herds.

Guineapigs were inoculated from the cream and sediment yielded by a pint of the milk as delivered. Many died in a month or less, but survivors were killed at 5 to 6 weeks.

Detailed postmortem examinations were made. Samples of blood were also tested by agglutination. The serum was diluted directly in the antigen to give 1 : 15, 1 : 45, 1 : 135. The density of the emulsion was 3·5 on Gates' scale. The tests were incubated for 9–12 hours at 37° C. and then read off.

The cream is said to contain more organisms than the sediment.

Six male guineapigs were fed with sediment containing the organism for 6 days and two developed lesions.

In one herd of 14 animals individual tests of milk were made and the milk of 9 were found to be passing the organism. Guineapig inoculation showed that the bacilli from two of these were more virulent than those from the remainder.

Similar results were obtained in a second herd, specially virulent strains being discovered.

Forty-eight other herds were subjected to tests, but in none of these were specially virulent strains detected.

It has already been recorded by SMITH that porcine strains are more virulent than bovine strains. Experience has shown that the majority of strains recovered from man possess a pathogenic power for the guineapig resembling that of the porcine strains. The possibility is suggested that passage of the bovine strain through man leads to such an exaltation of virulence.

The authors' observations lead them to the conclusion that the number of organisms present in the medium used for inoculation is a determining factor to some extent regarding the extent of the lesions produced.

VAN SACEGHEM (R.). Le formol-vaccin contre l'avortement épizootique des bovidés. [**Formol-Vaccine against Contagious Bovine Abortion.**]—*Bull. Méd. du Katanga.* 1926. Dec. Vol. 3. No. 6. pp. 164–166.

No details are given in this short note, but the author states that large doses of formol-vaccine have to be repeated at short intervals.

He says that experience shows that this vaccine is superior to vaccine killed by heat. The strength of formalin is 2 per 1,000, and it is said that 48 hours are required to cause the death of the organism.

The injection of the vaccine into infected animals produces a local and general reaction.

The vaccine is prepared by washing off the growth from glycerin agar and the formalin is added while the emulsion, which should be rather thick, is repeatedly shaken. The vaccine is incubated for 5 days at 37° C. It is then diluted until the density corresponds to ten million organisms per cubic centimetre. 0·5 per cent. carbolic acid is then added.

The dose is 20 cc. and six injections at intervals of ten days are recommended. If intervals of 15 days or more elapse anaphylactic symptoms may develop. [This method of vaccination would not appear to be suitable for use in this country.—ED.]

VAN SACEGHEM (R.). L'avortement épizootique des bovidés propagé par le chien. [**Bovine Epizootic Abortion spread by Dogs.**]—*Bull. Méd. du Katanga.* 1926. Dec. Vol. 3. No. 6. pp. 166–167.

In this brief note the author states that on some farms in the Belgian Congo he has noted abortion among dogs and cows simultaneously, and that serum from an aborted bitch caused agglutination of Bang's bacillus. No details are given.

SCHILLING (S. J.) & BLEECKER (W. L.). **An Investigation on the Production of** *B. abortus* **Aggressin.**—*Jl. Infect. Dis.* 1927. Apr. Vol. 40. No. 4. pp. 469–475.

The author found that the injection of a virulent strain of *B. abortus* into the peritoneal cavity of guineapigs resulted in the early death of the animals with an accumulation of purulent exudate in the cavity. The origin of the strain is not given.

Injections with exudate which, should it contain agressins, should hasten the development of infection in animals simultaneously inoculated with culture, failed to produce any such effect. Nor did injections of exudate confer any recognizable immunity.

FLEISCHHAUER (G.). Beitrag zur Züchtung der Abortus-Bang-Bazillen aus dem Tierkörper mittels verschiedener Methoden. [**The Cultivation of the Abortion Bacillus by Different Methods.**]—*Deut. Tierärzt. Woch.* 1927. Oct. 15. Vol. 35. No. 42. pp. 676–678.

The author has carried out comparative tests using Nowak's, Stafseth's, and Goerttler's methods in parallel, with a view to ascertaining whether any one was superior to the others, but it does not appear that he found any one of them more constantly successful than the others. He finds Goerttler's method disadvantageous on account of the time required to carry out the technique, and he does not find that the use of Petri dishes in this method offers any advantages over the tubes used in the others.

BÜCHLI (K.). Preventive Behandeling van Runderen tegen besmettelijk verwerpen, met levende, virulente culturen van abortus bacillen. [**The Protective Inoculation of Cattle against Contagious Abortion with Living Virulent Cultures of the Abortion Bacillus.**]—*Tijdsch. v. Diergeneesk.* 1927. Oct. 1. Vol. 54. No. 19. pp. 897–904.

The number of inoculations recorded by the author is too small to furnish evidence of much value.

He concludes that inoculation with living culture is free from danger. He states that abortion bacilli are passed out via the vagina by inoculated cows for a period of two weeks after they have been inoculated.

HUDDLESON (I. F.) & WINTER (O. B.). **Magnesium Ammonium Phosphate Crystals in Aerobic Cultures of** *Brucella abortus* **and** *Brucella melitensis.*—*Jl. Infect. Dis.* 1927. Apr. Vol. 40. No. 4. pp. 476–478.

The authors have observed the formation of crystals in a medium having the following composition : Beef liver infusion, bacto-peptone, sodium chloride, shredded agar, tap water and brom thymol blue indicator (reaction pH 6·6) when inoculated with *B. abortus* and *B. melitensis.* As growth at 37° C. takes place the pH figure rises, and at about 7·2 to 7·4 i.e., about the 4th day, crystals develop. If the tubes are sealed, or if 10 per cent. of the air is replaced by carbon dioxide there is little or no change in the pH of the medium. If the original pH of the medium lies between 6·8 and 7·4 the medium gradually becomes more acid under these conditions and no crystal formation occurs. If the tubes be unsealed or the carbon dioxide be removed the medium becomes alkaline and crystals form.

Crystals were removed for examination, but as they could not be obtained perfectly free from medium quantitative tests were not resorted to. Tests, chemical and optical, showed that the crystals were magnesium ammonium phosphate ($MgNH_4\ PO_4\ 6H_2O$).

CERRUTI (C.). **On the Relationship of** *M. melitensis* **and** *B. abortus.*—*Jl. Trop. Med. & Hyg.* 1927. Sept. 15. Vol. 30. No. 18. pp. 230–231.

With a view to helping to clear up the question of the relationship of these two organisms the author has carried out experiments between the two organisms with homologous agglutinins isolated in an indifferent medium, and he claims to have succeeded in " eliminating the interferences which may take place amongst the various compounds of the immune serum, and may alter the action of the agglutinating antibodies contained in it."

The sera were obtained from rabbits by inoculating them with killed organisms, with organisms attenuated by heat and chemicals, with living organisms, and also by inoculating with both organisms at the same time.

The technique used was Ogata's modification of that of Hahn and Trommsdorff.

The organisms agglutinated by their homologous sera are treated with 1 per cent. N caustic soda. The organisms agglutinated were washed with 10 per cent. saccharose to remove the immune serum. " To help the separation of the agglutinins the test tubes containing

the agglutinated organisms are kept in suspension in 10 per cent. saccharose solution containing 1 per cent. N alkali in an incubator at 42° C."

After 2 hours' incubation the tube is centrifuged and the agglutinating strength of the supernatant fluid is analysed, having taken care to neutralize and to bring the solution to 0·85 per cent. sodium chloride. Usually it is possible to isolate a percentage of 10 to 20 per cent. of agglutinins contained in the immune serum.

The author was not able to distinguish the organisms by using agglutinins so isolated.

VIDAL MUNNE (Jose). El aborto epizoótico y sus relaciones con la fiebre de Malta del hombre (Trabajo premiado por la Real Academia de Medicina y Cirugia de Barcelona). [**Contagious Abortion and its Relation to Undulant Fever in Man.**]—*Rev. Hig. y Sanidad Pecuarias.* 1927. Apr. Vol. 17. No. 4. pp. 265–281. [97 refs.]

This article is a review of the relations of *B. abortus* and *M. melitensis*, and thus consists chiefly of a summary of views put forward in the last few years. The author regards milk as a very important vehicle of infection with *B. abortus*, and states that the majority of cases of undulant fever in man where no caprine source can be found may be due to the contaminated milk of cows and, in a later section, that undulant fever is an enzootic which may affect animals and man; thirdly, that there is no valid method at present known of distinguishing the two organisms, the bacillus isolated by haemoculture from man or goats being designated *B. melitensis*, while, if isolated from the cow or other animal, it is called *B. abortus*.

From 90 cases whose sera agglutinated in a titre of over 1 : 200, the highest being 1 : 10,000, he found :—

Sera agglutinating in equal titre *B. melitensis* and *B. abortus*	41 or 45·5 per cent.
Sera agglutinating *B. melitensis* in higher dilution	11 or 12·2 per cent.
Sera agglutinating *B. abortus* in higher dilution ...	16 or 17·7 per cent.
Sera agglutinating *B. melitensis* only	11 or 12·2 per cent.
Sera agglutinating *B. abortus* only	11 or 12·2 per cent.

He also examined the sera of 256 cows killed at the slaughter-house of Barcelona and found 35·15 per cent. which agglutinated "la brucella" [*B. melitensis*] in a dilution of over 1 : 200, a close approximation to the figures of STUART (*Trans. Roy. Soc. Trop. Med. & Hyg.* June, 1925), where 31·2 per cent. of 542 sera examined agglutinated the *B. abortus*.

He has repeated the experiments of VERCELLANA & ZANZUCCHI on non-specific agglutination, but thinks that this method is valueless for differentiation of the organisms. A good and fairly comprehensive bibliography is appended.*

GRÄUB (E.). Infektionen beim Menschen durch den Bazillus des infektiösen Abortus Bang. [**Two Cases of Infection in Man due to Bang's Bacillus.**]—*Schweiz. Arch. f. Tierheilk.* 1927. July. Vol. 69. No. 7. pp. 394–395.

The author states that two cases are known to him of a disease of a typhoid nature in which a definite diagnosis was not established, but the serum of the patients agglutinated Bang's bacillus in a 1 : 1,200 dilution. No details are given.

* Summarized by Dr. H. Harold Scott.

CHURCHMAN (J. W.). **The Structure of *B. anthracis* and the Reversal of the Gram Reaction.**—*Proc. Soc. Exp. Biol. & Med.* 1927. May. Vol. 24. No. 8. pp. 737–739.

The author finds that the addition of a loopful of 1 per cent. acriviolet or gentian violet to ½ cc. of a heavy acqueous suspension of *B. anthracis* causes the organism to become gram negative in a period ranging from 2 to 19 hours depending upon the strain. He gives indications to show that *B. anthracis* is in reality gram negative internally and gram positive externally. The ectoplasm is removed by the acriviolet. Gram-negative anthrax bacilli are always more slender than gram-positive ones.

DESCAZEAUX (J.). Controle des vaccins anticharbonneux. [**Control of Anti-Anthrax Vaccines.**]—*Rev. d' Hyg. et de Méd. Préventive.* 1927. Aug. Vol. 49. No. 8. pp. 601–610.

Anthrax is one of the greatest scourges of stock in South America, and particularly in Chili, and the only hope of combating it with any degree of success lies in annual vaccination. In consequence of this there is a very large sale for anthrax vaccines both of local and of foreign production.

The State Veterinary Research Service has to test the value and efficacy of all vaccines, sera and biological products used. It has the power to forbid the use of vaccines proved to be of no value or dangerous in use. Some other countries appear to have a similar service. The State Control covers the suitability of the method of dispensing the vaccines or sera, purity, virulence, and immunity produced. In connexion with the first of these the author gives a few details of the manner in which the various liquid, and pill-form vaccines are put up.

With regard to tests of purity, these aim at ascertaining whether the bacillus of anthrax is actually present, and whether any contaminations have gained access to the vaccine. This is done both by microscopic examination and by plate cultivation, and if necessary by animal inoculation. The virulence of vaccines is tested by inoculation, using mice, guineapigs and rabbits. There appears to be some evidence to show that the power possessed by a vaccine to confer immunity is not necessarily directly related to its virulence. This is perhaps not to be wondered at, because it must be borne in mind that some of the immunizing principles may be present in the culture medium as distinct from the organisms themselves. The best vaccines are certainly those which comprise whole cultures. They are superior to emulsions of spores.

The presence of contaminations sometimes leads to a marked reduction in virulence of the vaccine. Some vaccines containing *B. subtilis* are entirely avirulent.

The author details the method of testing the immunizing power of vaccines. The standardization of anti-anthrax serum presents some difficulty, and animal inoculation with graduated doses followed by a virulent inoculation is the only method at present available.

A tabular statement gives details of tests of 9 vaccines, while a second gives details of tests of sera.

ARCHIVES DE L'INSTITUT PASTEUR D'ALGÉRIE. 1926. Dec. Vol. 4. No. 4. pp. 580–583. Essais d'immunisation des moutons algériens contre la fièvre charbonneuse au moyen des vaccins pastoriens. [**Vaccination of Sheep in Algeria with Pasteurian Vaccine.**]

Experiments carried out on sheep confirm results obtained elsewhere indicating that the intradermal inoculation of a single dose of 0·2 cc. of Second Vaccine confers a high degree of immunity.

ARCHIVES DE L'INSTITUT PASTEUR D'ALGÉRIE. 1926. Dec. Vol. 4. No. 4. pp. 584–585. Immunisation anticharbonneuse de bovins français, croisés et indigènes par inoculation intradermique du 2e vaccin d'emblée. [**Anti-Anthrax Immunization of French Cattle, Cross Bred and Native Cattle by the Intradermal Path.**]

As the result of experiments it has been found that 0·4 cc. of Second Pasteur Vaccine injected intradermally protects all three types of animals.

MORRIS (H.) & RILEY (H. K.). **Growing Plants as Possible Carriers of Anthrax.**—*Louisiana Sta. Bull.* 196 (1926) pp. 4–16. Ex. *Exp. Station Record.* 1927. Feb. Vol. 56. No. 2. p. 173.

The authors found that under laboratory conditions anthrax spores were carried from artificially inoculated soil by germinating and growing plants, including corn, oats, rice and beans. A few tests also showed that spores were carried by Bermuda grass and bull grass. The spores were on the surface and not in the tissues of the plants, and washing plants with water for three consecutive days failed to remove the whole of the contamination from them.

VELU, BALOZET & BIGOT. Étude de l'immunisation contre le charbon symptomatique par la voie intradermique ou cutanée. [**Immunization against Black Quarter by the Intradermic or Cutaneous Path.**]—*Rec. Méd. Vét.* 1927. July 30. Vol. 103. No. 14. 284–288.

If the immunity produced by local immunization is a function of the receptivity of the tissue or organ, it is legitimate to put the hypothesis that no immunity can result when the tissue or organ is not receptive. The authors have tested this view in experiments with black-quarter vaccine.

THEILER (A.) & ROBINSON (E. M.). Parabotulism des Equidés. [**Parabotulism in Equines.**]—*Rev. Gén. Méd. Vét.* 1927. Apr. 15. Vol. 36. No. 424. pp. 193–199.

The authors describe a condition which has come under their notice at times during the last ten years and which was thought to be a motor paralysis with cerebro-spinal meningitis. It occurred in horses and mules, but more usually in the latter, which were in daily work and were stabled. Mortality was high. As a rule the onset was sudden, and the disease disappeared within a few days of its appearance. Cases were recorded in the Transvaal, Orange River Colony, and the Cape. Outbreaks at Onderstepoort enabled the authors to investigate the condition.

The first outbreaks suggested that the disease was of a contagious nature, but experiments of various kinds furnished no positive evidence of this and the idea was discarded.

In only two cases did the injection of blood taken from mules dead of the disease produce infection, and in these death took place within 24 to 48 hours. These deaths were considered as accidental, but complete solution of the nature of the disease furnished an explanation for them.

As already mentioned, the disease appears as a motor paralysis and death occurs within 48 hours with symptoms of asphyxia. There is no elevation of temperature. In cases which survive recovery is exceedingly slow.

Post-mortem examination revealed no lesions which could be held responsible.

The organism held responsible by the authors is a specific one which they propose to call *Clostridium parabotulinum equi*. It is closely related to the organism which causes Lamziekte in cattle, and it is not distinctly related to *B. parabotulinus* (Seddon) and *Clostridium urciliae* (Bargsten).

The toxin is not found in all decomposing rat carcases. The authors have so far, with the exceptions of the original case, been able to detect it in the carcases of those which have actually ingested cultures. Similarly, horses which have eaten foodstuffs tainted with the carcases of rats have remained free.

When outbreaks occur among horses they are to be attributed to rats which are occasionally infected.

DACK (G. M.), STARIN (W. A.) & WERNER (Marie). **Growth of** *Cl. botulinum* **and** *Cl. sporogenes* **in Veal Infusion Broth under Reduced Pressure.**—*Jl. Infect. Dis.* 1927. Apr. Vol. 40. No. 4. pp. 525–532.

At air pressures of 4 cm. or less growth was regular and occurred in most cases in two or three days. At pressures above this it was irregular, and no growth at all was obtained at pressures greater than 16 cm., and there appeared to be no difference between spores and vegetative elements at reduced pressures. Toxin was not demonstrated in greater dilutions where 0·8 cm. pressure was used than when 5 cm. was employed. Oxygen pressures of 5 and 10 cm. prevented growth (period of observation 3 months). Carbon dioxide pressures up to 50 cm. did not inhibit growth in any way. Maximum development took place during the first day and toxin was at its greatest concentration by the 5th day.

HARE (T.) & GLYNN (E.). **Observations on Lamb Dysentery.**—*Jl. Path. & Bact.* 1927. Apr. Vol. 30. No. 2. pp. 473–502. With 1 fig. & 4 graphs.

This paper is largely concerned with statistical enquiries regarding the disease. The lesions are described and the etiology is discussed. Comparisons are drawn between this disease and melaena neonatorum. The authors do not agree with GAIGER'S findings that *B. welchii* (or an allied organism) and *B. coli* are causally connected with the disease.

IAKHNIS (B.). La prémunition des nouveau-nés par le B C G. [**The Protection of the Newly-Born with B. C. G.**]—*Ann. Inst. Pasteur.* 1927. Oct. Vol. 41. No. 10. pp. 1045–1062.

This paper deals entirely with the immunization of human beings. The vaccine was administered by the mouth in three doses of ·01 g. on the 3rd, 5th and 7th days after birth. Four hundred and four of 472 treated remained under observation. It is too early to judge results, but in no case did the administration of the vaccine cause any disturbance of health.

TURNER (A. W.) & DAVESNE (J.). Rôle du *B. oedematiens* dans l'étiologie de l'hépatite infectieuse nécrosante (Braxy) du mouton australien. [**The Part played by** *B. oedematiens* **in the Causation of Infectious Necrotic Hepatitis (Braxy) in Australian Sheep.**]—*Ann. Inst. Pasteur.* 1927. Oct. Vol. 41. No. 10. pp. 1078–1096. With 2 text figs.

The condition resembles the disease known in Great Britain as braxy, but it is apparently not identical with it. In order to avoid misunderstanding ALBISTON has suggested the name infectious necrotic hepatitis.

The condition is widespread in Australia, and its incidence varies in different parts. In New South Wales the majority of cases occur during the autumn, in Victoria from the end of the summer to the onset of the winter rains. The distribution of the disease varies locally. In some places certain farms are specially dangerous. Statistics regarding the extent to which the disease occurs cannot be collected with any pretence at accuracy, but it appears to be a fact that very young lambs are less frequently affected than those of nine months or more.

Symptoms are seldom observed, but they can be detected if a batch of lambs, comprising some sick ones are driven, as there is a marked tendency to lag behind on the part of those that are affected, and they are quite apathetic, offering no resistance to handling or examination. Death generally takes place within half-an-hour of an animal lying down. There is generally but little rise of temperature.

It is said that the best members of the flock are generally seized. On removing the skin the subcutaneous tissue is found to contain a pink jelly-like material which rapidly becomes dark in colour and the vessels are congested. The peritoneal cavity contains a variable amount of clear exudate. The spleen, kidneys and abomasum are slightly congested but one never finds oedema or necrosis of the mucous membrane of the fourth stomach. The mesenteric glands may be slightly inflamed, but the intestines themselves appear to be normal.

The liver is slightly enlarged, and of a dark red colour, and shows greyish white or dirty yellow areas of necrosis. These are firm, irregularly circular in outline, and range from ¾ to 5 centimetres in diameter.

In very exceptional cases no visible necrotic areas may be found.

Histological examination reveals a necrotic centre to the lesion surrounded by a zone showing marked cellular infiltration. The bacilli form a felted ring round the necrotic centre. A remarkable lesion is the presence of a variable amount (50 to 100 cc.) of clear lemon yellow exudate in the pericardium. This liquid readily coagulates. Ecchymoses may be found on the ventricle walls. The lungs are usually normal.

The authors have isolated a bacillus, the chief characters of which are as follows. The organism is variable in size, and in cultures may form short chains. The ends are rounded, and individual bacilli may be straight or curved. The cytoplasm rapidly becomes granular.

Although the authors have not been able to see any evidence of motility they have been able to demonstrate cilia. Spores are oval, subterminal and cause slight distension of the body. The bacillus is gram-positive, but shows two or three dark bands across it.

The authors found great difficulty in getting the organism to grow in artificial culture, but they eventually succeeded by growing it in shake cultures in nitrate or glucose agar. Details of the appearances of cultures in different media are described. Peptone liver broth appeared to be the best. In shake cultures in agar gas production occurs, and colonies of various kinds may be found: lenticular, budding, and filamentous.

In peptone water glucose, laevulose, lactose, saccharose, are attacked within 24 hours, and galactose in 3 days. Maltose, dulcite, mannite, glycerin and inulin are not attacked.

Very small doses (0·1 cc.) introduced intramuscularly or subcutaneously prove fatal to guineapigs in 16 to 24 hours. There is a subcutaneous oedema, which is non-putrid. There may be congestion of the stomach, spleen, and intestines. The kidneys, suprarenals and liver are always markedly congested and sometimes there are spots of necrosis under the capsule of the liver. These, however, are sterile. There may be an exudate in the pleural cavity, but it is not found in the pericardium.

Liver broth cultures yield a toxin which is fatal to the mouse in a dose of 1/200 cc. The toxin is markedly haemolytic, 0·1 cc. of culture haemolyses 0·4 cc. of a 1/20 suspension of sheep corpuscles. The toxin is completely destroyed by exposure for an hour to 60° C., but the haemolysin is not completely destroyed by the same exposure.

The authors give information regarding the neutralization by anti-oedematiens serum of cultures of Albiston's organism, but they do not appear to have tested this serum with the organism they have isolated themselves.

BRANCH (A.). **Spontaneous Infections in Guinea-Pigs. Pneumococcus, Friedländer Bacillus and Pseudotuberculosis** (*Eberthella caviae*).—*Jl. Infect. Dis.* 1927. Apr. Vol. 40. No. 4. pp. 533–548. With 3 text figs.

During the period February to June 1926 the author investigated the causes of death among a stock of some 400 guineapigs of which 114 died. 56 were infected with Friedländer's bacillus, 36 with pneumoccus, 5 with *B. bronchisepticus*, 3 with streptococcus, 3 with *Eberthella*. In the remainder the cause of death was not determined.

DACHENA (G.). Sulla diagnosi biologica delle setticemie emorragiche per cuti-scarificazione. [**The Diagnosis of Haemorrhagic Septicaemia by Cuti-Scarification.**]—*La Nuova Veterinaria.* 1927. Sept. 15. Vol. 5. No. 9. pp. 212–214.

KOULIKOFF (V.) & SMIRNOFF (P.). Nature physico-chimique de la toxine et de l'anatoxine diphtériques. [**The Physico-Chemical Nature of Diphtheria Toxin and Anatoxin.**]—*Ann. Inst. Pasteur.* 1927. Nov. Vol. 41. No. 11. pp. 1166–1174. With 2 charts

DISEASES DUE TO FILTERABLE VIRUSES.

NAINSOUTA (R.). Note sur la peste du cheval au Sénégal. [**Horse Sickness in Senegal.**]—*Rev. Gén. Méd. Vét.* 1927. Nov. 15. Vol. 36. No. 431. pp. 644–646.

The distribution of horse-sickness in Africa is far wider than was at one time thought, and it appears to be certain that the disease occurs in Senegal. Locally-bred equidae, although resistant to the disease, are of little value on account of their small size. Imported animals are almost certain to succumb. The problem therefore is to find some method of protective inoculation. The cavalry in Senegal are mounted for the most part on Algerian animals, and these pay a heavy tribute to the disease annually between October and January. French horses are even more susceptible. Sahal and Soudanese animals present a fair degree of resistance.

The author states that a good opportunity presented itself to investigate the subject when he was at St. Louis in 1923, but the authorities would not take the risks. He suggests that investigations should be carried out on the following lines :—

In the first place, attempts should be made to infect indigenous animals by intravenous inoculation. After they have recovered large doses of virulent blood should be given with a view to hyperimmunising them. Sero-vaccination should then be tried on susceptible races of horses beginning with the less susceptible and working up to the most susceptible (French) horses. A few experiments on these lines have been carried out.

Two native-bred animals were each given 5 cc. of blood from an Algerian horse which died of the disease two days later. Five days later they showed dullness, depression, rapid respiration, deep colouration of the mucous membranes, and rapid rise of temperature. There were no local manifestations of the disease. Recovery was complete in about 3 weeks.

Three weeks later these animals were again inoculated intravenously with 5 cc. of blood from an Algerian horse in the acute stage of the disease. Ten days later one of these was given 200 cc. of blood from a French mare which had died from a peracute attack. An Algerian horse which had recovered from a mild attack about a month previously was given 5 cc. of blood from the same mare. There were no reactions of any kind. It therefore appears to be justifiable to suppose that one attack immunizes.

Two Moorish horses were given 5 cc. of virulent blood subcutaneously, and one of them was also injected with 60 cc. of serum from one of the two country-bred horses originally inoculated. The other received no serum. The latter reacted on the 8th day, while in the case of the former the period of incubation was 11 days.

The disease was, however, of about equal severity in both animals. The hyperimmune serum was taken before any large dose of virulent blood had been given and it is suggested that prolongation of the hyperimmunization might furnish a more potent serum or that a larger dose might have been more effective.

OLITSKY (P. K.) & BOËZ (L.). **Studies on the Physical and Chemical Properties of the Virus of Foot-and-Mouth Disease. III. Resistance to Chemicals.**—*Jl. Exp. Med.* 1927. May 1. Vol. 45. No. 5. pp. 815-831.

The authors publish experiments to show that the apparent resistance offered by the virus of foot-and-mouth disease to the action of alcohols of various strengths, acetone, etc., is in reality due to protection of the virus by coagulation of the proteins around them. While the virus survives in undiluted lymph to which alcohol is added, if it be first filtered to remove as much as possible of the protein and then subjected to the action of alcohol the latter is found to be responsible for death of the virus in 1 to 15 minutes, depending upon its concentration.

By adding alkali, in itself insufficient to kill the virus, but in amount sufficient to prevent coagulation of the protein on the addition of 60 per cent. alcohol, the virus was acted upon by the alcohol without any protective protein coagulum and was promptly killed.

Experiments showed that perchloride of mercury, cresol and compound cresol which cause coagulation of protein act in the same way as alcohol and the virus is protected by the coagula formed. On the other hand, 1 per cent. antiformin and 2 per cent. sodium hydrate which cause no coagulation are promptly fatal to the virus, more promptly indeed than they are to staphylococci.

OLITSKY (P. K.) & BOËZ (Louis). **Studies on the Physical and Chemical Properties of the Virus of Foot-and-Mouth Disease. IV. Cultivation Experiments.**—*Jl. Exp. Med.* 1927. May 1. Vol. 45. No. 5. pp. 833–848.

Part of this paper is taken up with a discussion of the evidence brought forward to show that the virus is not a fluid virus, but actually particulate, nor of an inanimate nature. In their experiments they have not been able to get any evidence of success in cultivating the virus.

They find that the optimum pH is 7·5 to 7·6, a strict anaerobic atmosphere is favourable, and the temperature should be below 37° C. A semi-solid medium such as ¼ per cent. agar or 10 per cent. gelatin appears to be advantageous. The latter is the better of the two, it should be as pure as possible and the reaction should be adjusted with potassium hydroxide and not with buffer phosphate.

OLITSKY (P. K.). **Physical, Chemical, and Biological Studies on the Virus of Vesicular Stomatitis of Horses. Comparison with the Virus of Foot-and-Mouth Disease.**—*Jl. Exp. Med.* 1927. June 1. Vol. 45. No. 6. pp. 969–981.

There is evidence to show that the viruses of foot-and-mouth disease and vesicular stomatitis of horses resemble each other to some extent, but they are sharply distinguished by cross immunity tests and by their natural pathogenic range. But it must be remembered that there are strains of foot-and-mouth disease virus which are not mutually protective, and further there are some strains which will not infect guineapigs. In the absence of any method of cultivating filterable viruses available information is limited, but it must be concluded at any rate for the time being, that the viruses are very closely related.

Experiments regarding the effects of wave-length and energies of monochromatic ultra-violet light indicate the probability that the chemical nature of the virus approximates to that of bacteria.

PLANTUREUX (E.). Recherches sur la rage. Nouvelles méthodes de traitement antirabique. [**Rabies. New Methods of Treatment.**]—*Arch. Inst. Pasteur d'Algérie.* 1926. Dec. Vol. 4. No. 4. pp. 528–572.

Rabies is extremely wide-spread in Algeria, and in Algiers itself scarcely a week passes without cases in dogs and herbivora coming under notice.

The various methods of treatment employed for human beings bitten by rabid dogs are not applicable in veterinary practice because they involve too many injections, and the simpler methods hitherto tried have not yielded the results expected. The author has therefore carried out investigations with a view to finding some simple and efficacious method of protective inoculation.

The paper under consideration is divided into three sections. The first summarizes the principal methods already utilized, the second deals with research regarding systems of vaccination, and in the third the author gives results obtained from experiments designed to furnish a simple method of protective inoculation which can be applied to animals.

In the first part the author classifies the methods which have been employed as follows :—

I. Inoculations with normal virus—
   (*a*) intravenous injections ;
   (*b*) intraperitoneal injections ;
   (*c*) subcutaneous injections with fixed virus.
II. Inoculations with modified virus—
   (*a*) by passage through monkeys ;
   (*b*) by desiccation ;
   (*c*) by heat ;
   (*d*) by antiseptics, phenol, glycerin, and ether.
III. Serum-therapy, sero-vaccination, and mixtures of serum and virus.

The author points out that although there are to be advanced reasons for and against the treatment of rabid dogs, and according to French law all such dogs must be killed, there is nothing to prevent attempts to save herbivora.

The essential characters of a vaccine which is to be of service are :—

1. It must be reasonably cheap.
2. Few inoculations must suffice.
3. It must be capable of transmission to a distance from the laboratory.
4. It must be simple in application.

Rabies vaccines differ from vaccines in general in that they produce neither local nor general reactions. They are also peculiar in that they can be used during the period of incubation. In these cases it is really a matter of a race between the vaccine and the virus. In any case it is one of the essentials that treatment be begun as soon after the animal has been bitten as possible. Both PASTEUR and HÖGYES showed that the whole series of their vaccines could be injected in the course of a single day. The author considered that it might be possible

to inject a sufficiently large dose of fixed virus to ensure the rapid production of immunity if it were incorporated with a fatty medium to reduce the rate of absorption. Lanoline in conjunction with olive oil was tried, but had to be abandoned because of the frequent development of abscesses. It is also stated that intracerebral and intra-ocular inoculation appeared actually to make the animals more susceptible to infection. The oil was then replaced by 33 per cent. solutions of dextrin. Weaker concentrations did not always prevent the development of rabies, and stronger solutions tended to result in abscess formation. Emulsions in dextrin must be used at once, as they lose virulence rapidly, but this defect was overcome. In experiments with rabbits it was found that the dextrin-virus conferred some immunity if given before infection, but as a method of treating after infection it failed. Two injections given to dogs before infection conferred protection, as did also injections given after infection. Intra-ocular inoculation appeared to break the immunity down. The results of experiments with goats and sheep indicated either that these animals acquire immunity more readily than dogs or that the street virus used was less virulent for these species.

In one experiment comprising nine goats the results of vaccinating with dextrin virus after inoculation with street virus were favourable.

The harmlessness of the virus treated in this way must be thoroughly investigated before the method can be recommended, but in any case it is advised that three doses be given on the 1st, 3rd, and 5th or 6th days.

In seeking a method which could be employed by practitioners it was decided to use brains preserved in carbolized serum and dextrin solution. Since the dextrin appears to cause attenuation, these two could be sent out to practitioners separately with instructions regarding the mixing. The emulsion in carbolized serum was prepared by emulsifying one part of brain (preserved in glycerin for several days to kill contaminations) in 19 parts of a mixture containing 400 cc. of normal saline, 1 g. of carbolic acid and 200 cc. of horse serum. This forms the third vaccine, and is used for preparing a 1 per 1,000 dilution and a 1 per 150 dilution for the first and second vaccines respectively. Although the author looks upon the dextrin-virus as an advance on other methods he has in mind the production of a vaccine containing killed virus. This would be capable of preservation for long periods, would require no special technique for injection and would be the only vaccine standing any chance of being used in practice.

Formalin was tried as a means of killing the virus, but in no case using different concentrations of formalin were favourable results obtained when the mixture was incubated at 37° C. He had more favourable results when the 4 per 1,000 formalin solution was allowed to act for a week at room temperature. Dogs, sheep and goats were given 3 to 6 injections of doses ranging from 70 to 100 cc. with intervals of 1 to 4 days. In some of the experiments a vaccine which was nearly 7 weeks old was used with success.

GERLACH (F.). Die internationale Lyssakonferenz in Paris. [**The International Rabies Conference in Paris.**]—*Prag. Arch. f. Tiermed. und vergl. Path.* 1927. June 15. Vol. 7. Pt. B. No. 6. pp. 167–173.

The Conference was held in Paris from April 25th to 30th. Four committees were set up to consider the four questions : (*a*) The nature

of the virus ; (*b*) the technique of protective inoculation ; (*c*) post-vaccinal ill-effects ; (*d*) vaccination of animals.

The committee was unable to express a view regarding the nature of the bodies demonstrated by LEVADITI and MANOUELIAN. The nature of Negri bodies is still a matter of uncertainty. Subcutaneous inoculation with fixed virus is generally harmless in man, but occasionally it causes infection. Attenuated viruses (either by phenol or ether) are more generally employed.

Exact explanation of the paralytic symptoms sometimes following anti-rabic treatment could not be furnished. These symptoms less frequently follow the use of carbolized or glycerined virus.

There was no agreement as to whether antirabic treatment should be compulsory, but the majority were of the opinion that it should be compulsory where infective saliva has gained access to a mucous membrane.

It was recommended that the question of the plurality of street viruses should be investigated. It was suggested that Institutes should from time to time submit their viruses to a particular Institute for comparative examination. At all Institutes certain particulars should be noted in every instance. In particular detailed descriptions should be kept of all cases of paralysis.

With regard to the immunization of animals and particularly of dogs the Commission recommended that investigations be prosecuted. The vaccine should be a virus which was not pathogenic for the dog by subcutaneous or intramuscular inoculation. The inoculation should be repeated annually and in the first instance should be carried out at a recognized Institute.

With regard to other species. Vaccination of the other domesticated animals should only be carried out in districts where the disease is of frequent occurrence. Inoculation should not be practised unless it can be done within 4 days of an animal being bitten, or at the very latest 10 days.

KASAI (H.). **An Additional Study of Caprina, the Prophylactic Vaccine for Sheep-Pox.**—*Jl. Jap. Soc. Vet. Sci.* 1927. Sept. Vol. 6. No. 3. pp. 271–272. [Author's English Abstract.]

1. The passage of the sheep-pox virus was made through goats in 15 successive cutaneous inoculations with almost similar eruptions in every generation and we found neither gradual increase of the virulence against the goat as recorded by Konew nor gradual decrease of virulence, as the author found to be the case when cow-pox virus was passed through sheep.

2. Animals used for the passage of sheep-pox maintain perfect immunity against the introduced virus and remain refractory to revaccination with sheep-pox, but they are susceptible to cow-pox virus. Caprinized sheep-pox virus produces typical eruptions in normal sheep, but no reaction is observed with sheep previously immunized against sheep-pox. The sheep-pox virus seems, therefore, to be stable with its immunogenic property even after caprinization inoculating cutaneously through many goats.

3. The sheep-pox virus passed through goats by cutaneous inoculation shows a remarkable decrease of virulence for the sheep, i.e., it produces no lesions by any path of inoculation, and passage through the sheep does not exalt the virulence again.

BLANC (G.), MELANIDI (C.) & STYLIANOPOULO (M.). La variole des chèvres en Grèce. [**Variola of the Goat in Greece.**]—*Bull. Soc. Path. Exot.* 1927. July 13. Vol. 20. No. 7. pp. 583–587. With 2 text figs.

Variola of the goat appears to have made its first appearance in Greece during the war.

Rare isolated cases were recognized in a number of places in November 1926, but after this it became epizootic in character.

Only goats were attacked, although these grazed alongside sheep.

It generally takes from three to five months for an outbreak to work itself out in a herd, and the mortality is from 5 to 15 per cent. of the animals attacked.

The period of incubation is 2–3 days, and it is marked by fever, loss of appetite, and dullness.

The eruptive stage of the disease is characterized by the appearance of red patches, which are of course most easily seen on hairless parts. These become papules, which in turn, by a process of thickening, become hard dermal nodules as large as nuts, which are painful on pressure. Friction readily removes the surface of these, leaving weeping sores which become covered with yellow crusts which subsequently turn black. In some cases lesions developed in the nasal cavities, larynx and trachea, but lesions have not been observed in the buccal cavity. In a good many cases unilateral or bilateral specific keratitis occurs. When death occurs it is almost always due to pulmonary complications.

The skin lesions run their course in about three weeks and leave characteristic scars.

The evidence so far obtained from observation and from a small number of experiments indicates that the disease is transmissible to neither man nor the sheep.

LEWIS (Margaret A.) & ANDERVONT (Howard B.). **The Adsorption of Certain Viruses by means of Particulate Substances.**—*Amer. Jl. Hyg.* 1927. July. Vol. 7. No. 4. pp. 505–513.

Vaccine virus, in dilutions of 1–100, was adsorbed by means of carmine, baked kieselguhr, kaolin, and charcoal. It was inactivated by carmine, baked kieselguhr and kaolin when these substances were added in amounts greater than 10 per cent. It was inactivated by kaolin in amounts greater than 2·5 per cent. India ink sometimes inactivated the virus in amounts of 5 and 2·5 per cent. and always in amounts of 50 and 75 per cent. Fowl-pox virus was adsorbed by 20 to 50 per cent. of baked kieselguhr, by 20 per cent. of kaolin, and 20 per cent. wood charcoal. It was inactivated by 75 per cent. India ink, 50 per cent. baked kieselguhr and 20 per cent. kaolin.

Chicken tumour virus was not adsorbed (save in one instance) by kieselguhr, kaolin, or India ink. It was adsorbed and inactivated by carmine when more than 1·25 per cent. of carmine powder was added to a 1–10 per cent. extract of tumour.

KELSER (R. A.). **A New Vaccine for Rinderpest Immunization.**—*Milit. Surgeon.* 1927. July. Vol. 61. No. 1. pp. 31–33.

The author first refers briefly to Boynton's vaccine—a heated, glycerinized and phenolized mixture of blood and finely ground tissues

taken from animals in the acute stages of the disease. This has to be kept in a refrigerator for two to three months before it can be used with safety, but thereafter it must be used within a short period or it loses its potency. This vaccine, apart from the disadvantages attaching to its nature and method of preparation, is said to have been found to possess considerable merits.

"The Research Board has shown that the blood entering into the preparation of Boynton's vaccine is of no value as an immunizing agent. Thus, the active portion of the vaccine is diluted with a substance which, because of its nature, detracts very materially from the keeping qualities of the vaccine which is not a sterile product. The high glycerin content further dilutes the product 33⅓ per cent.

"As a result of research work conducted by the Medical Department Research Board, working in co-operation with the Insular Bureau of Agriculture, a new vaccine has been prepared which overcomes the shortcomings of the Boynton product."

Susceptible cattle are inoculated with 2–10 cc. of fresh citrated blood taken at the height of reaction. When the thermal reaction begins to subside the animals are bled to death and the spleen, liver, kidneys, testicles and various glands [apparently lymphatic glands are referred to] are removed with aseptic precautions and placed in sterile covered retainers. The mesenteric glands are not taken, as they are frequently found to contain pathogenic sporulating organisms.

The fat and fascia are trimmed from the organs which are then placed in 5 per cent. phenol solution for 15 minutes. They are then rinsed in two changes of sterile water.

The tissues are cut in pieces of suitable size to put through a large sterilized food chopper, the ground material being collected in a sterile container as it comes through the machine. This ground tissue is then carefully covered to prevent contamination and placed in an ice-box (at 2° C.) till the following day. After thus standing the tissue grinds better.

This minced meat is then reground in a special grinder, which will so reduce it that it can readily be worked through a forty-mesh sieve. The tissues are put through this machine 6 times. Sterile salt solution is added in the proportion of 1 cc. per gram. This has added to it ·75 per cent. chloroform and it is thoroughly shaken. The stoppered bottles are then dipped in 10 per cent. liquor cresolis compositus and placed in the refrigerator.

The tissue must be very finely ground up so that the chloroform may kill the virus within a few hours, but it is not detrimental to the immunizing constituent of the vaccine.

In most of the experiments the author states that the vaccine has been used within 24 hours of preparation.

The dose is 20 cc. and three doses are given at intervals of a week. The test animals have been infected (sic) with 2 cc. of virulent blood a fortnight after the third dose. Such tests are said to have demonstrated that the animals are fully immune.

It is suggested that it may be possible to reduce the dose and the number of doses.

A full report is promised.

In a footnote to this paper the Surgeon General U.S. Army disclaims responsibility for the opinions expressed and the conclusions reached.

MISCELLANEOUS.

KLUKHINE (E.). Du rôle de la peau dans la production des anticorps, de l'anaphylaxie et de l'antianaphylaxie. [**The Part played by the Skin in the Production of Antibodies, Anaphylaxis and Antianaphylaxis.**]—*Ann. Inst. Pasteur.* 1927. Oct. Vol. 41. No. 10. pp. 1108–1113.

The author sets out to answer two questions. Under what conditions are heterologous proteins absorbed by the skin ? Under what conditions may such absorption cause an anaphylactic shock ?

By applying sheep corpuscles or an ointment of lanoline containing killed Eberth's bacillus the author found by serological tests that the antibody production was in proportion to the alterations occurring in the skin as a result of the shaving of the area treated. Where no visible alteration occurred the absorption was unrecognizable. In a second series of experiments various antigens such as horse serum, dead cultures, etc., were applied to the skin, and then sensitization was tested by inoculation. Only in the case of horse serum did the test inoculation produce shock, and then the shock was in proportion to the alterations occurring as a result of the shaving of the skin.

Animals sensitized to horse serum by parenteral injection do not exhibit symptoms of shock when antigen is applied to shaved skin.

Sensitized guineapigs can be vaccinated antianaphylactically by application of the protein to the skin.

NIIMI (K.). **Experimental Studies on Osteomalacia in the Horse. First Report. Etiological Significance of Calcium Deficiency in the Diet. Part. I.**—*Jl. Jap. Vet. Sci.* 1927. Sept. Vol. 6. No. 3. pp. 273–283.

Two horses were fed upon barley, which the author finds to be very deficient in calcium, and after about 5 months symptoms of osteomalacia developed.

The symptoms were licking, gastro-intestinal catarrh, and loss of appetite. There was gradual loss of condition, and the bones, particularly those of the face, became slightly swollen. There was evidence of pain in the bones. Neutrophil polynuclear leucocytes increased in numbers, and there appeared at first an increase in the basophil leucocytes. The amount of urine was increased in both animals, and it had an acid reaction. As the animals lost condition the amount of phosphorus pentoxide present in the urine increased.

On post-mortem examination complicated phenomena of resolution, absorption, new formation, and proliferation of bone tissue were observed in the spongy calcareous trabeculae of the ribs.

BOURBON & CHOLLET. Accidents de photosensibilisation chez le mouton à la suite d'administration d'extrait éthéré de fougère mâle. [**Photo-Sensitization in Sheep resulting from the Administration of Ethereal Extract of Male Fern.**]—*Rec. Méd. Vét.* 1927. Sept. 15. Vol. 103. No. 16. pp. 530–532.

The flock was treated with 5 grammes daily mixed with edible oil. The first day was cloudy, but the second sunny. Two hours after

dosing had begun the shepherd noticed that some of the animals had swollen heads. This was very pronounced in some cases. Manipulation showed that the swelling was doughy.

The animals recovered when housed, and no further symptoms were observed during the following week, while the treatment was continued, but the animals were kept indoors. There was no evidence to suggest that any plants ingested had caused the photosensitization.

DICKINSON (C. G.). **King Island " Coasty " Disease.**—*Aust. Vet. Jl.* 1927. Sept. Vol. 3. No. 3. pp. 82–85.

There are grounds for thinking that " Coastiness " or " Coasty " disease of King Island is similar to, if not identical with, the " bush sickness " which occurs on the pumice lands in New Zealand (Rotura District).

" The symptoms are those of a progressive anaemia—lachrymation, scouring, wasting, dry harsh coat, etc."

The disease makes its appearance in cattle which have been grazed for about 6 months on the land running along the west side of the Island. This land is separated in some places from sound country—grazing on which cures the disease—by a road or a fence only.

Comparative analyses of " coasty " and " sound " soil reveals a remarkable deficiency of iron in the former. Sound soil contains 5 to 7 times as much oxide of iron and alumina. Further, a high percentage of alkaline carbonates in the coasty soil probably renders the iron still less available.

Points of similarity between " Coasty " Disease and " Bush Sickness " are as follows :—

(1) In both cases there are symptoms of progressive anaemia. (2) Diseased cattle may be cured by grazing on " sound " country. In King Island there is grazing ground which will neither cause nor cure " Coasty " Disease. This is classed as " semi-ground." (3) In both cases cured cattle do not, although cured, improve in general condition until grazed again on " coasty " or " bush " grazing. (4) In both cases the soils of affected runs are of a loose, non-binding nature. (5) It requires about 12 months to produce the symptoms in " bush " disease, but the symptoms of " Coasty " disease usually develop in about 6 months. In experiments in New Zealand the dressing of the land with carbonate of lime decreased the period requisite for the development of symptoms. In other words, this addition caused the New Zealand soil to approximate more closely in composition to that of King Island.

On King Island the practice is to graze the animals for a few months at a time in the coasty and sound country alternately, finishing them off on the coasty soil. This country, although it produces the disease, also has the best grazing.

With dairying cattle the problem is more complicated.

It was decided to try a treatment used in New Zealand, namely, to provide a lick of iron ammonium citrate 2 ounces to 4 lbs. of brown sugar. Brown sugar masks the bitter taste of the iron.

In an experiment in which four calves were used the results indicated that this lick would prevent the disease and also would cure it. In a second experiment the amount of lick actually necessary was controlled

—the lick having been given regardless of cost in the first. The results obtained indicated that it will probably cost less to supply the drug and sugar than to send animals away to sound land.

It is also suggested that in the case of dairy herds it may be possible to administer the salt in the drinking water.

JONES (F. S.) & LITTLE (R. B.). **An Infectious Granular Vaginitis of Cows.**—*Jl. Exp. Med.* 1927. Mar. 1. Vol. 45. No. 3. pp. 519–528.

This condition is stated to be one of the common diseases of cows in the United States. It is described as an acute inflammation of the vaginal mucous membrane and terminating in the formation of raised red nodules.

The cases, to the number of over 100, were encountered in the course of an epidemic of the disease in a herd which lasted from November 1925 to February 1926. Sporadic cases were seen subsequently. The vulva was swollen and tender, and the mucous membrane was congested and sprinkled with tiny indistinct greyish white areas which coalesced to form plaques of greyish or yellowish white exudate. When this was forcibly removed a greyish red surface was exposed. In some cases there was mucopurulent exudate, and when the " exudate sloughed " a granulating surface was exposed. Round red nodules 1–2 mm. in diameter appeared in the mucous membrane.

There was no evidence of disease elsewhere and the general health of the animals remained normal. The yield of milk was unaltered.

By staining smears of exudate with giemsa or with dilute fuchsin it was found possible to demonstrate a considerable number of minute bacilli with polar granules.

Cultures on ordinary media failed to develop this organism, but cultures were obtained upon blood agar. For the first few generations growth was limited to the condensation liquid. In later cultures the bacilli are longer and stain more deeply than those found in the smears or in earlier cultures. Later generations will grow in the condensation of plain agar containing sterile animal tissue. A number of sugars were tested but no fermentation was observed. Milk is not altered in appearance, but it is not stated whether growth actually takes place in this medium.

Rabbits weighing 2 kg. withstand 2 cc. of blood broth culture injected intravenously, and 0·5 cc. injected intraperitoneally into guinea-pigs causes no disturbance of health. 2 cc. produces a peritonitis which is fatal in 24 hours. At death the organism can be cultivated from the blood.

Acute inflammation resulted from the introduction of culture into the vagina of heifers with the subsequent production of " granules."

CORDIER. Le pH Sanguin. [**The pH of the Blood.**]—*Rec. Méd. Vét.* 1927. Aug. 15. Vol. 103. No. 15. pp. 467–479 (to be continued).

REVIEWS AND NOTICES.

LEESE (A. S.) [M.R.C.V.S., Captain Late R.A.V.C., Camel Specialist to the Govt. of India, 1907 to 1913, etc.] **A Treatise on the One-Humped Camel in Health and in Disease.**—382 pp. With 20 plates, 3 charts & 9 figs. 1927. Stamford, Lincolnshire : Haynes & Son, Maiden Lane. [16s.]

All interested in the camel owe a deep debt of gratitude to Captain Leese for the publication of this book which is the fullest and most up-to-date general treatise ever published on the subject. As the author states in the preface, the book is not primarily written for the scientist, although it is unlikely that any one exists who could not learn a great deal from a perusal of its pages. The language employed throughout is such as to be understood by non-professional men dealing with camels, and the author goes to great pains in explaining technical details in a simple, straightforward manner.

The book comprises 36 chapters and 382 pages, and is divided into two parts, the first of which deals with the history, anatomy, breeds ; management, both under civil and military conditions ; breeding, watering, feeding and other matters. In a work so full of detail and sound common sense, it is difficult to stress any special part, but we would like to draw attention to the chapters on feeding and pack work, which if carefully studied and adhered to, will prevent untold losses to owners and suffering to camels.

The second part deals with more strictly veterinary subjects, and the author describes in detail the chief surgical diseases met with in camel practice and his method of dealing with them. The chapter on Trypanosomiasis is a comprehensive résumé of all recent work on the subject, and the author considers that there are at most probably only two distinct types of trypanosome affecting the camel, and holds that the differences described by some workers whereby several species have been named, are more apparent than real. Under this head he describes symptoms, methods of diagnosis, staining of blood films and treatment of affected camels in great detail, but it would appear to me that he puts rather too much faith on the ability of the layman to diagnose the condition. I refer to the following : where in dealing with anthrax he says, " If a camel dies suddenly without obvious cause, its blood should be examined for trypanosomes ; and, if none are found, and both plant-poisoning and snake-bite can be eliminated, a smear of blood should be taken and sent for examination to the nearest veterinary surgeon." The other specific contagious diseases are dealt with in a special chapter. I am fully in accord with Captain Leese in questioning the occurrence of cattle plague and foot-and-mouth disease in the camel, although various authors have considered it to be susceptible. All known parasites, internal and external, are dealt with and the book concludes with chapters on poisonous plants and the examination of camels for soundness.

The author quotes freely from other authorities, but the bulk of the subject matter is the fruit of his experience and personal observations, and he holds very decided opinions on many points. Captain Leese has chiefly studied the camel in India ; thus Indian conditions are dealt with most fully, but he has also worked and travelled extensively in other camel countries and gives us a general survey of the one-humped camel wherever found. In describing the camels of Arabia and the Sudan, the author makes no mention of the " wasms " or tribal brands by which camels bred by different tribes are marked, and on which the greatest importance is placed by Arabs, nor under surgical diseases, does he mention the occurrence of stringhalt or that troublesome condition of popliteal abscess, the results of which frequently cause so much difficulty in " barracking." The use of chloral

hydrate as an intravenous injection for producing anaesthesia, which was extensively used during the war, is not alluded to, but these are, however, but small omissions and the general opinion of the reader must be that Captain Leese is the master, both of his subject, and of the art of expounding it to others. Although other camel experts may not agree with all the opinions expressed, the author gives a good reason for his statements.

There are 20 original plates, exceedingly well reproduced, the paper used is good, but it is unfortunate in my opinion that the print of the book is so small as to be somewhat trying to the eyes of the reader. Captain Leese, however, explains that this is unavoidable as it was essential to reduce the bulk of the book so as to render it more serviceable to the camel-master who is usually " on the move." A good index and a glossary of vernacular terms are included. The book must be obtained direct from the author, c/o the Publisher, and we would call attention to the very moderate price making it available to everyone dealing with the camel, for without it his equipment cannot now be complete.

D. S. Rabagliati.

KNOWLES (Robert). [B.A. (Cantab.), M.R.C.S., L.R.C.P., Lt.-Col., Indian Medical Service, Fellow of the Asiatic Society of Bengal, Professor of Protozoology. Calcutta School of Tropical Medicine.] **An Introduction to Medical Protozoology with Chapters on the Spirochaetes and on Laboratory Methods.**—pp. xii+887. With 174 text figs. and 15 coloured plates. 1928. Calcutta: Thacker, Spink & Co. [Rs. 25.]

Like many others, as indeed he says in his preface, the author of this volume found that the absence of a suitable text-book in English was one of his chief difficulties when he began teaching medical protozoology to post-graduate students at the Calcutta School of Tropical Medicine in 1921, and the present volume is intended to obviate that difficulty.

The author regrets that so little of the volume is original and so much of it is, as he tersely describes it, ' loot,' but it may be said that the looting has been done with skill and discrimination. All the books dealing with medical protozoology have been utilized in the compilation of the volume, and the result is a very practical book. WENYON's " Protozoology " is the greatest contributor by far.

The book is divided into three parts, namely, Part I, Lectures on Protozoology; Part II, Laboratory methods; and Part III, References to Literature.

The first part covers some 600 pages, and its contents are divided into 19 lectures. The author in his last three lectures goes outside the bounds of strict protozoology and deals with the spirochaetes, spirilla, treponemata, rickettsia bodies, the chlamydozoa, and finally adds some notes on rabies.

The volume has been put together within the incredibly short space of nine months, but it shows little or no evidence of rapid preparation. No doubt the large contributions made to it by the works of other authors materially assisted in shortening the period required for the production of the volume. An occasional slip catches the eye here and there. For example, on Plate IX, facing page 218, the figures referring to figs. 2 and 3 appear to have been reversed. In Plate X the reference letters F and H would appear to have been transposed, the figure 9 is missing from the page number on page 339, and on page 344 there is a misprint in the spelling of *Lynchia maura*.

The volume is clearly printed and profusely illustrated with line drawings, half-tone blocks, and coloured plates, taken as the author states very largely from other works.

It is perhaps to be regretted that so large a book should be bound in covers which appear to be scarcely robust enough.

The publishers request that mention may be made of the fact that copies of the work can be obtained from Messrs. W. Thacker & Co., 2, Creed Lane, E.C.4.

The price of the book in England is £2 1s. 8d., and in India it is Rs. 25.

A. L. Sheather.

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